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The Mining Journal

LONDON, JUNE 24, 1960

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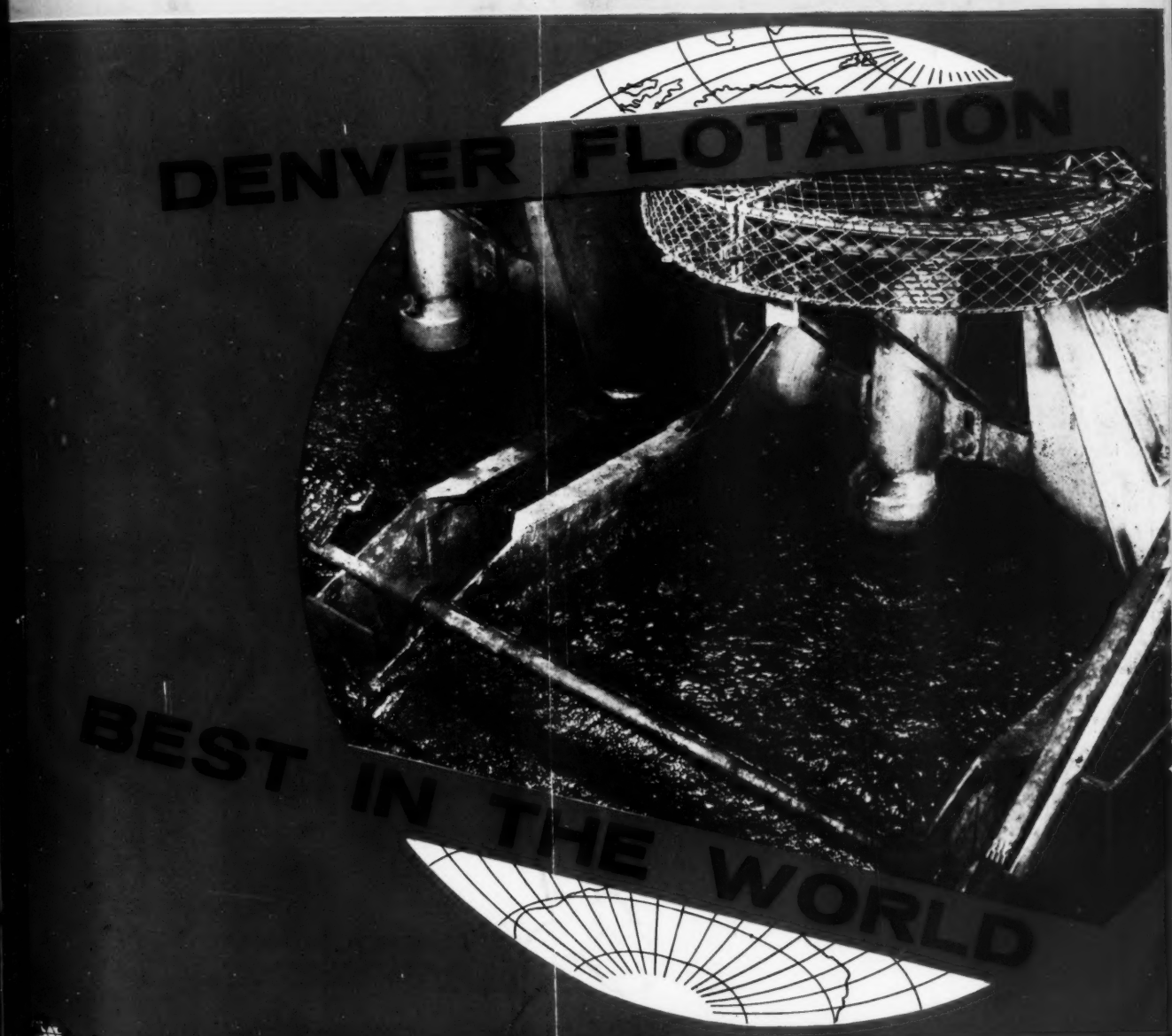

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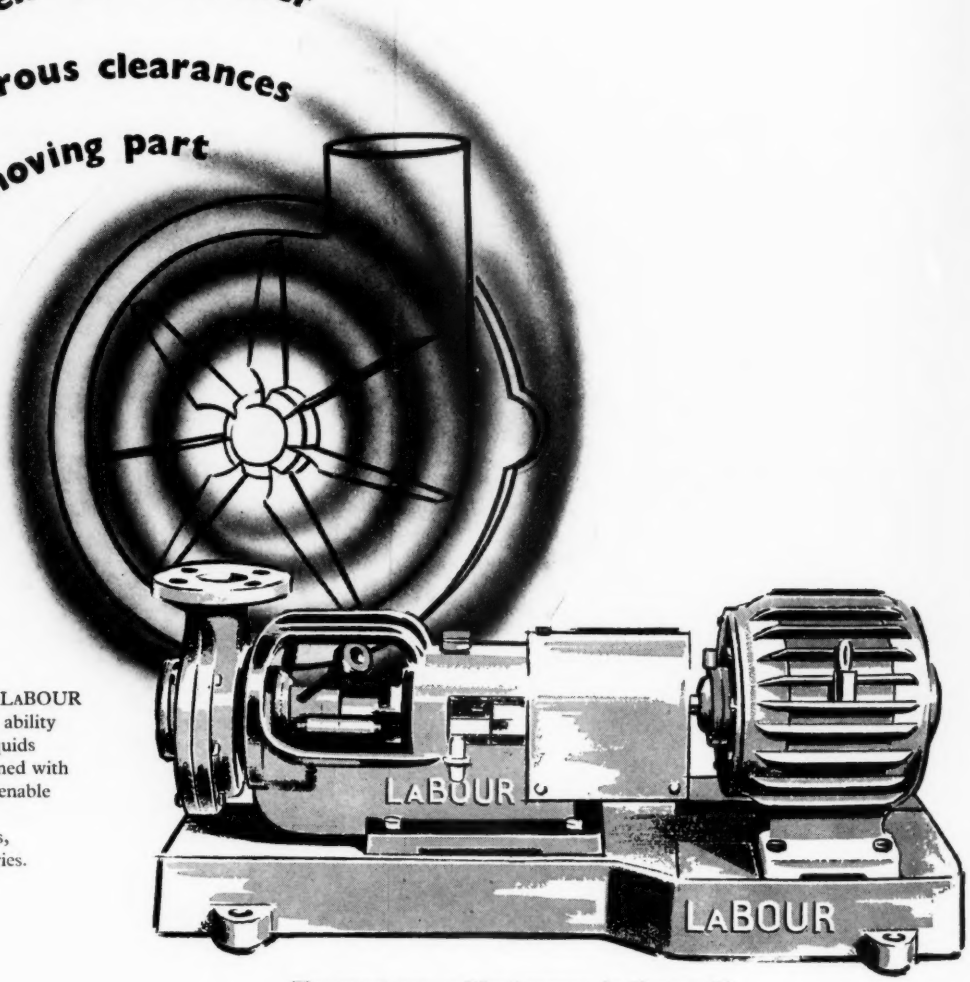

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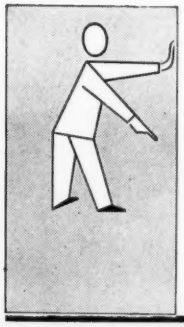

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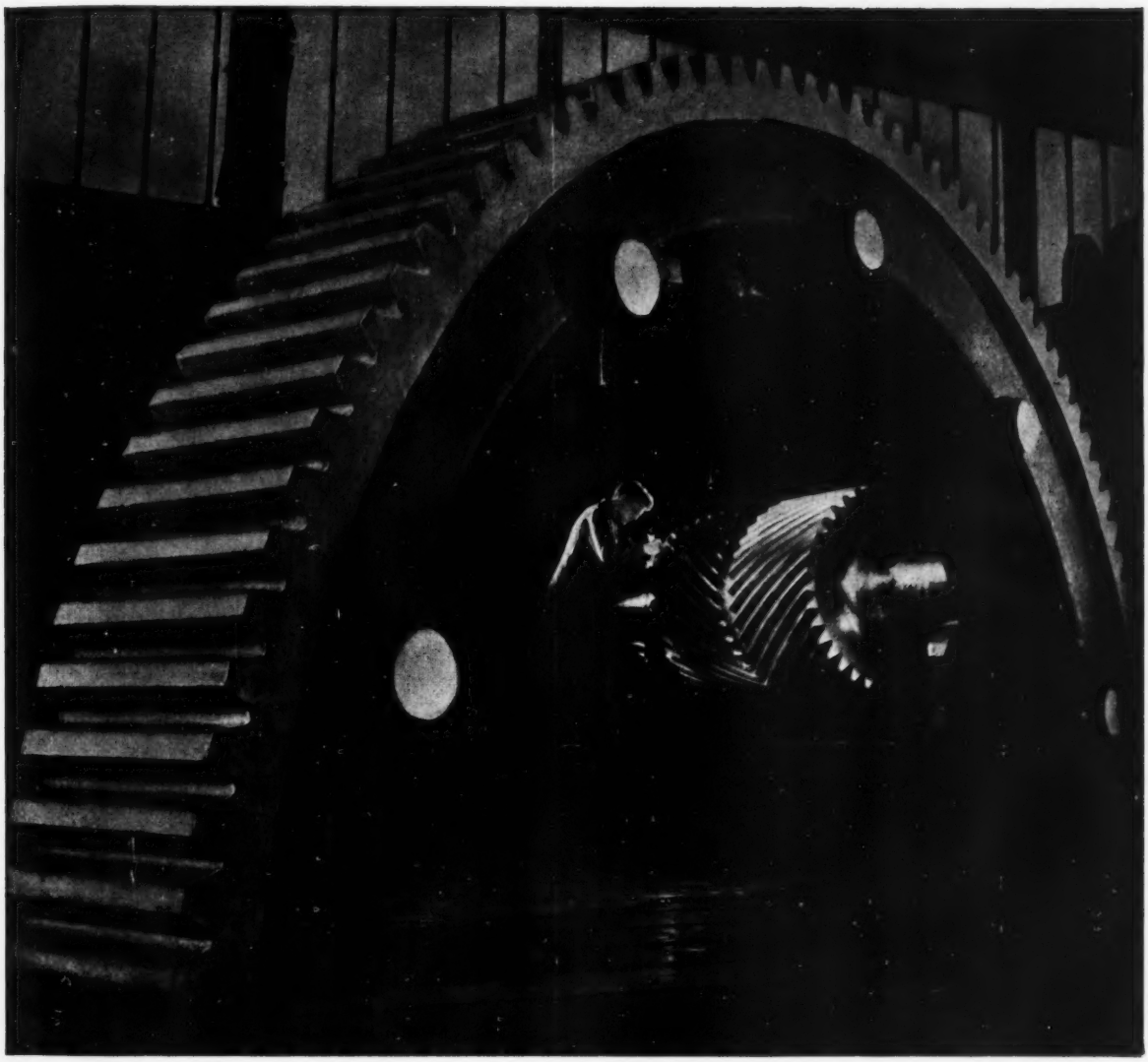

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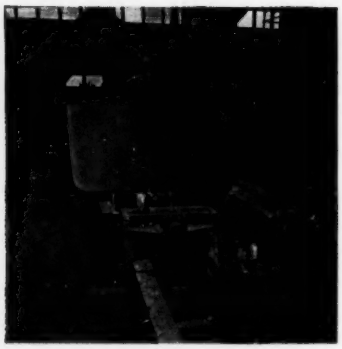

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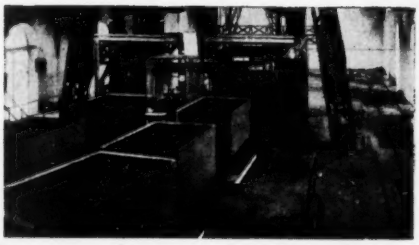

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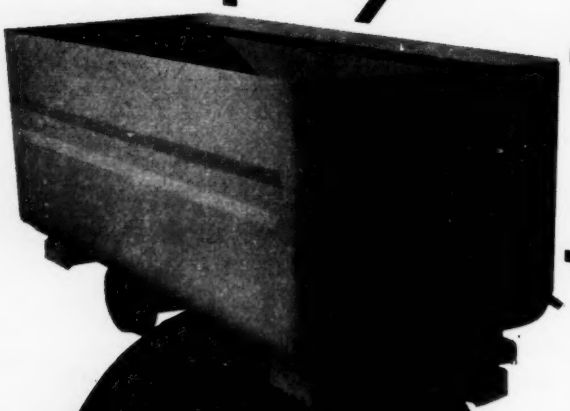

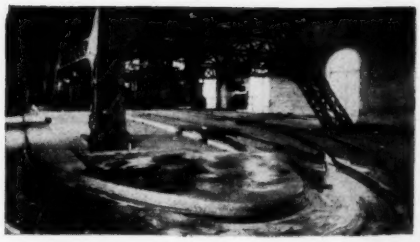

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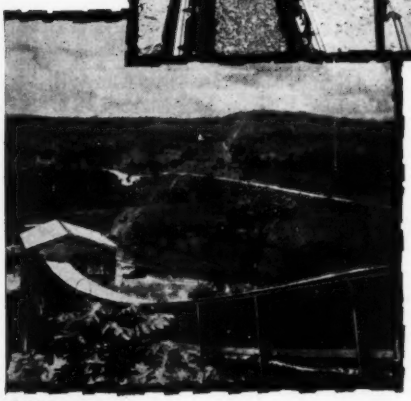

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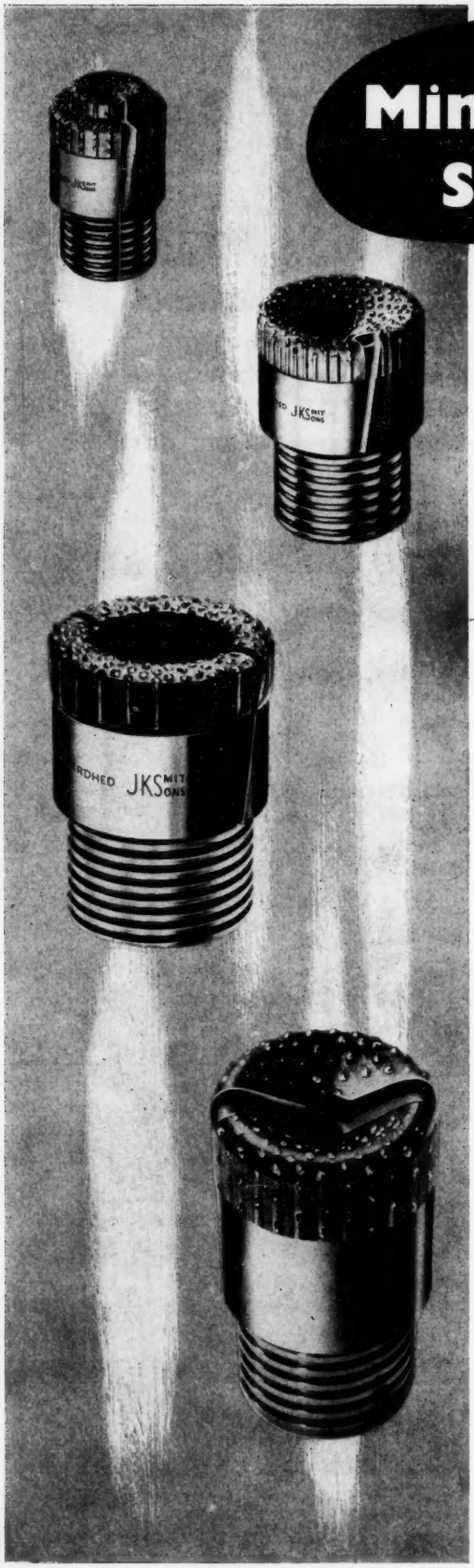

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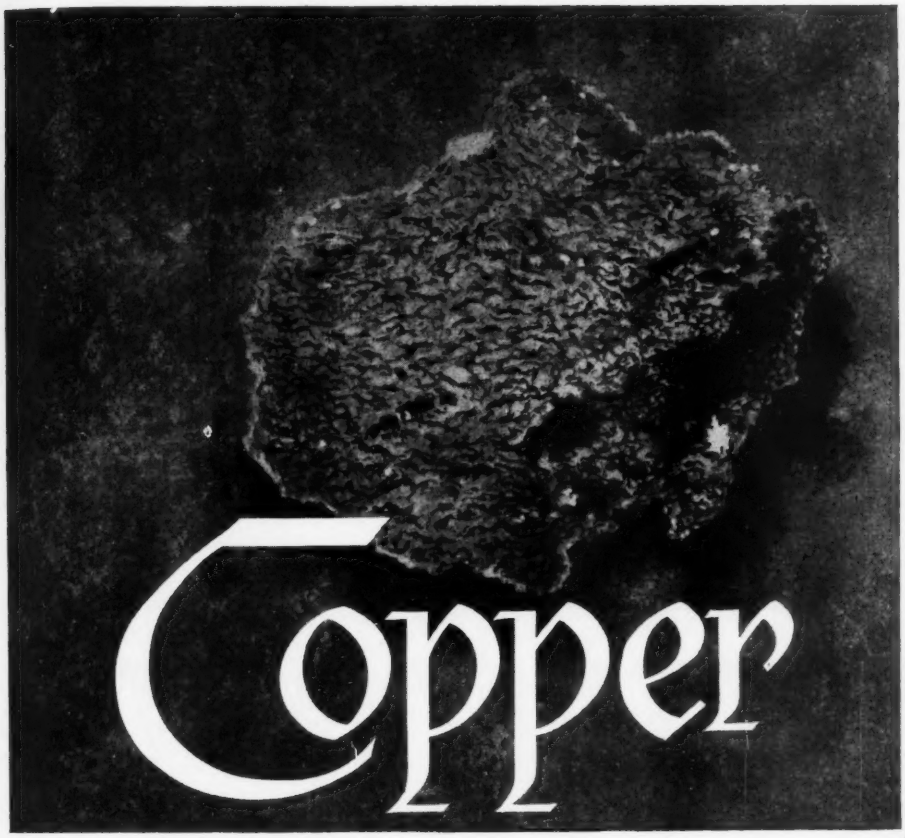

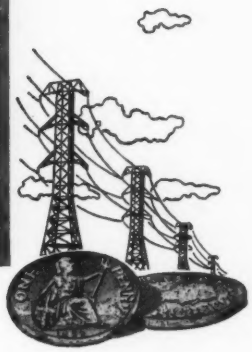

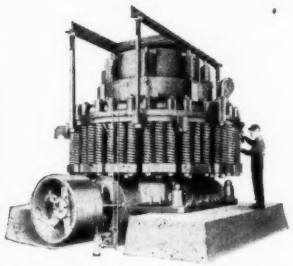

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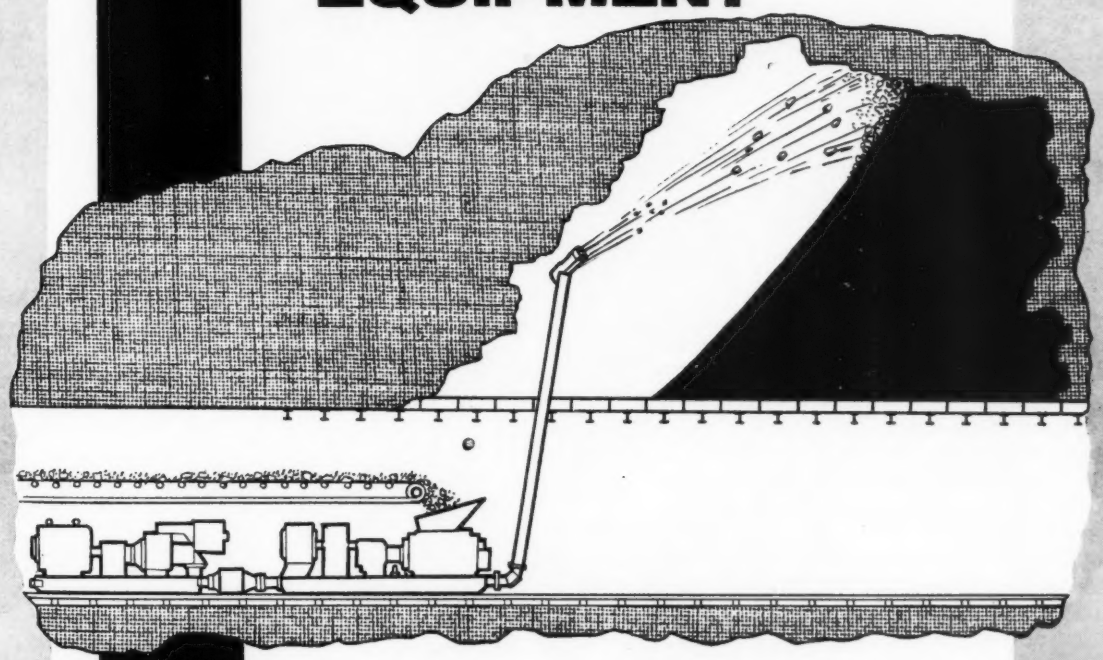

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The Mining Journal

London, June 24, 1960

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Editor
U. Baliol Scott
Deputy Editor
A. Graham Thomson

Assistant Editor
R. Bowran

Assistant Financial Editor
R. A. Nuttall

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

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The Congo in Travail

ON Thursday, June 30, one of the largest and potentially one of the richest territories in Africa, with a population of some 13,500,000 Congolese and 113,000 Europeans, ceases to be a colony and makes its debut on the world stage as a fully independent state. Never has the birth of a new nation been more anxiously watched by other countries and never has there been greater uncertainty as to the outcome of emancipation.

Events have moved with dramatic swiftness since the Leopoldville riots of January, 1959, which preceded King Baudoin's promise of independence " with strings attached ". These riots were due to a combination of political and economic factors which were closely connected. The world commodity slump led to a serious fall in employment and this setback to the Congo's prosperity came at a time when the tide of African nationalism was running strongly in the neighbouring territories and filtering to an increasing extent across the Congo's borders.

Once having accepted the principle of an independent Congo, Belgium's prime objective has apparently been to ensure that, as far as possible, the economic bonds uniting the two countries should be preserved. In hurrying the Congo to independence at a pace which left no opportunity for the gradual handing over of power, Belgium has retreated far from its original position in the hope that, by accepting the responsibilities of a parent with none of the rights, she will continue to be associated with the economic development of the Congo, while shelving much of the growing financial burden. In effect, Belgium is consciously gambling on the retention of African goodwill and the stake is over £1,000,000,000 of Belgian capital tied up in the country. But even this huge stake is dwarfed by the wider issues involved. Though largely an undeveloped country, the Congo has enormous raw material resources and is one of the world's principal mining countries. Besides being the fifth largest producer of copper, it accounts for over 50 per cent of the total cobalt output and between 7 and 10 per cent of the total tin output, besides gold and silver, diamonds, and a variety of other minerals and metals. Of even greater significance, however, is its strategic position in the midst of other African countries which have recently become independent or will become so in the next few years. A politically stable Congo, governed on democratic principles, would be a powerful buttress against Communist domination in Africa. Conversely, a chaotic and hostile Congo might swing a large part of Africa to the Communist *bloc*.

The background to Congo independence and the political and economic problems facing the first Congolese Government were discussed in our issue of March 18, 1960, pp. 319-321, where it was stated that, of all the Congolese leaders at the Brussels Conference, Mr. Lumumba, the leader of the Congolese National Movement, alone seemed to have shown a grasp of the problems of national unity or indeed any strong aspirations towards national leadership.

His competitors, on the other hand, have shown little capacity to

visualize the benefits of a strong unitary state. Their preference is for largely autonomous regions in which tribal identity and institutions could be preserved. Mr. Lumumba's party is the strongest in the first Chamber with 36 seats out of 137 and it was to this leader that the formation of a national government was initially entrusted.

Like the Belgians, Mr. Lumumba is in favour of a united Congo. His task was complicated, however, by the intransigence of rival leaders and not least by the existence of strong separatist movements. His most formidable opponent is Mr. Joseph Kasavubu, leader of the Abako party around Leopoldville, who has demanded the presidency of the new federal Congo as his price for co-operation. Mr. Kasavubu's objective is a separate or autonomous Bakongo State, and he dreams of recreating the powerful pre-European Bakongo kingdom, which stretched into what are now the French Congo Republic and Angola.

In the Katanga, the rich mineral province bordering on Northern Rhodesia, a political struggle is in progress between the two leading parties, the Conakat and the Cartel, and a state of emergency has been declared. The Katanga supplies some 60 per cent of the central government's revenue and receives back only about 9 per cent. The Conakat party, headed by Mr. Moise Tsombe, wishes to keep all Katagna's wealth for Katanga and has threatened to set up a completely autonomous government. This party lays great emphasis on its friendship for Europeans and some of its leaders favour federation with Northern Rhodesia. Cartel has threatened to set up a government of its own in north-eastern Katanga.

A major crisis erupted only 13 days before independence, when the task of forming a national government was taken from Mr. Lumumba and given to his chief rival Mr. Kasavubu. Angrily accusing the Belgians of double dealing, Mr. Lumumba threatened to set up a rival government in his provincial stronghold. Mr. Kasabuvu's efforts proved abortive, however, and Mr. Lumumba has again been asked to form the Congo's first government. He has stated his readiness to do a deal with his rival on the basis that Mr. Kasavubu would be Head of State with himself Prime Minister, but on the condition that he could choose his own government.

There is widespread relief at the prospect of an eleventh-hour solution to the political deadlock, though the future of the new government must depend on Mr. Lumumba's ability to retain effective control over a group of men with little or no political experience and with a diversity of aims and aspirations. He might well prove equal to the task.

The possibility of Congo anarchy has been alarming not only to Britain, Portugal and France, but also to other African states, and it is noteworthy that a Nigerian leader suggested the appointment of Dr. Bunche to mediate between the Congo factions. The Central African Federation has sent troops to the Katanga border and Angola has been strengthening its defences in the frontier provinces. The African Conference in special session at Addis Adaba has stigmatized these moves as a serious threat to the integrity of Congolese territory on the eve of independence.

In all these circumstances it is scarcely surprising that investor confidence in the Congo should have been badly shaken. Nevertheless the situation scarcely justifies the excessively depressed level to which the shares of Congo mining companies have fallen, a pointer not without significance being that the apprehensions of overseas investors do not appear to be fully shared by the men on the spot.

In assessing the long-term outlook, it should not be forgotten that the Congo has advantages which should become increasingly apparent once the country begins to settle down. Not least of these is the very fact that the numbers of European and Asian settlers are so small relative to the black population, that the problem of safeguards for racial minorities should be a much less disturbing issue than in some other African territories.

A more positive advantage is the existence of an African middle class of clerks, junior technicians and minor officials, created by the Belgians within the framework of a highly developed network of social services. The Congo in general and the Katanga in particular have a higher proportion of educated Africans than many other African territories. These people would be reluctant to see their relatively high living standards threatened by political chaos and internal strife. Lacking political and administrative experience, however, they would be quite incapable of running the country without the Belgian Civil Service.

At present almost all senior non-clerical posts are held by Belgians, many of whom are understandably anxious as to the permanence of their present jobs. Although Belgium will contribute to their salaries, which amount to some £20,000,000 a year, the cost of maintaining the Belgian officials will be a heavy financial burden for the Congo, besides which an African government would naturally be disposed to replace them as soon as possible with Africans. Years must elapse, however, before sufficient Africans could be trained for the higher posts to form the nucleus of an efficient civil service. It is to be hoped that in the meantime the Congolese Government will have the sense to lean on the Belgians, and that the latter will be wise enough to make themselves as unobtrusive as possible.

The Congo's most valuable asset is, of course, its mineral wealth which, under Belgian rule, was the most significant factor in the economic and social advancement of the colony and which is of no less critical importance to the emergent state. There is nothing to suggest that the Congolese, as they evolve politically, will be any less realistic than the peoples of Ghana, Guinea and other African territories in their attitude to overseas investment and to the mining companies on whom they are so dependent not only as a source of employment but also for the improvement of living standards.

The Congolese leaders, however much they may be swayed by personal ambitions or by tribal chauvinism, would be short-sighted indeed to kill the geese that lay the copper and diamond eggs. But unless the new government has sufficient strength and authority to keep order throughout the territory, the possibility can scarcely be excluded that mining operations at some centres might be subject to temporary interruption as a result of tribal clashes and other local disorders. For the maintenance of law and order the national government will inherit the small but efficient fighting force known as the Force Publique, which is officered by Belgians down to the rank of senior N.C.O.s. It is questionable, however, whether an African government could contemplate the use of white-officered troops to quell an African rebellion.

Some of the financial problems associated with the transfer of power have yet to be settled. However, the Belgian Government has stressed its determination to hand over to the new government a country which is financially and economically in a sound position and various measures have already been announced. In the first place, agreement was reached with the Belgian Congo companies whereby they would support the Congo Treasury by return transfers of funds from Brussels to the Congo and by advance payments of taxes, royalty and dividends due to it. These will total 2,500,000,000 Belgian francs. Secondly the Belgian Government has obtained for the Congo Treasury a short term loan in New York of $20,000,000. In addition, it is negotiating a long term loan of $40,000,000. Thirdly, the National Bank of Belgium and the Central Bank of the Congo have concluded a convention which will allow them to join forces in the defence of the stability of the Congo currency. These measures will add in dollars and Belgian francs the equivalent of 4,000,000,000 Belgian francs to the reserves of the Central Bank of the Congo.

Plans have also been made by the Belgian Government for native official holdings of shares in Congo companies to be used to aid the Congo's future development. The shares in

question are those belonging to the Congo Government and therefore accruing to the Congolese Government on June 30. At the second round table conference at Brussels held on May 16 this year it was proposed that these large shareholdings should be entrusted to a new development company of 50 per cent Belgian ownership charged with the task of raising funds for economic expansion. This conference resulted in the proclamation of various other resolutions of direct concern to mining companies (vide *The Mining Journal*, May 27, 1959, p. 609). These resolutions have no validity, however, until they have been accepted by the first Congolese Government.

Congolese representatives have categorically disclaimed any intention of nationalizing industries, and particularly mining companies. The new government, however, will acquire an interest of about 20 per cent in Union Minère by taking over the shareholding of the Comité Special du Katanga. The fact that the Congolese Government will be a major shareholder in most of the big companies is in itself a reason for supposing that the operations of mines and smelters will be allowed to remain profitable. Moreover, there is added protection in a law passed by the Belgian Parliament which would enable companies operating in the Congo to transfer their assets outside the Congo to Belgian companies.

Whatever the difficulties of the transition period, mining must assuredly remain one of the main pillars of the Congo's economy. There was certainly no pessimism in M. Paul Gillet's address to shareholders of Union Minière at the annual meeting on May 27. In the chairman's words, Union Minière so far has brought no modification to the normal rhythm of its financial and commercial operations. In fact, further investments are contemplated which would ensure a continuous increase of production. M. Gillet made it clear, however, that the development of future programmes would be dependent on the political, economic and social climate that the new authorities would be able to create.

Provided it faces its immense responsibilities with resolution and ability, the Congolese Government can unquestionably count on loyal assistance from the mining industry.

THE CHALLENGE TO COAL

This year the Association of Mining Electrical & Mechanical Engineers is celebrating its 50th year of existence; half a century of steady progress since the Association was registered in September 1910. At that time there was woeful inefficiency existing in the engineering branches of mining and it says much for the enthusiasm of the founders of the Association that within a few months they had appointed an Examinations Board and conducted examinations to measure the proficiency of some 75 candidates. These examinations for Certificates of Competency have been held every year since that time and the acceptance by the Mining Qualifications Board in 1956, of the Association's First and Second Class Certificates, and in 1959 of the Honours Certificate as qualifying for the appropriate statutory certificates, is evidence of the standing of these examinations. Almost 100 certificates were awarded last year by the A.M.E.M.E. Examinations Board.

This month the A.M.E.M.E. has been holding the annual convention at Blackpool — in the county where the Association was officially founded. During the period June 13 - June 17 a very full programme included technical papers by authors from many countries, culminating in an address by Sir James Bowman, Chairman of the National Coal Board. Not unnaturally, in the light of the present situation, the theme of this address was the future of the industry. Speaking of this, Sir James said that he felt the coal industry today had reached one of the most critical stages in its history. He added that this year, production and demand are in balance. Next year, and in future years, the task must continue to be to regulate production policies to the trend of demand, in order to make a progressive reduction in stocks.

" In the ten years after nationalisation " he went on, " we experienced an unprecedented period in the coal industry — with the demands of a constantly expanding economy continually outstripping the available supplies of coal — a seller's market of a most extreme and persistent kind. Quite frankly, we can see no prospect whatsoever of a return to the conditions of that period. Our plans for the future must be laid in the awareness of that fact, and in face of the realities of the present state of the industry.

" In 1965, we expect power stations to need 55,000,000 tons of coal, compared with 46,000,000 tons last year. And we expect power stations' requirements of coal to go on rising for some time after that.

" The very depressed situation in the export market at the present time is, we hope a temporary one. Today with freight rates for American coal at totally unprofitable levels and with Polish and Russian coal being sold abroad at prices that can bear no possible relation to costs of production, it is completely uneconomic to do business on the export market. This year we expect to sell 5,000,000 tons of coal on the export market, at a loss of £7,000,000 compared with our inland prices — bargain prices if you like. We are bearing these losses because we believe that there will be an improvement in the export market and we estimate that there will be an export market for 10,000,000 tons of British coal in 1965— providing we are able to produce it at an economic price."

He added that the foremost, and most significant, of the long-term factors responsible for the difficulties of the last three years was competition from the oil industry, particularly in the large and vulnerable market for industrial coal. Last year the use of oil in this country in markets where it directly competes with coal amounted to 30,000,000 tons of coal equivalent — 90 per cent higher than in 1956. This year so far, the consumption of oil in these markets is already 26 per cent higher than in the same period of last year.

Sir James went on : " Here is the primary task facing the industry in the future. We believe that a level of sales of 200/215,000,000 tons is attainable in 1965. But to achieve that position we shall need an industry very much more compact — concentrating on the most efficient, lowest cost producing pits — extensively modernised — with 80 per cent of its output coming from new and reconstructed pits, and making the maximum use of up-to-date machinery and techniques — and above all, if we are to meet the challenge of competition, highly efficient. The plan for coal demands that the 500 to 550 pits remaining in the industry should in 1965 produce between 200 and 215,000,000 tons at an average, overall, output per manshift of 30 to 31 cwts."

EXPLOITATION OF ISRAEL'S MINERALS

A report, recently submitted to the Ministry of Development, Jerusalem, by Sir Ben Lockspeiser, chairman of the Technological Advisory Board, contained a survey of the progress made so far in the exploitation of natural resources in the country and also some recommendations for further development in this field. The main items mentioned in this report are the following.

As regards copper, there are indications of the existence of primary copper deposits in the Timna district near Eilat. Geophysical investigations and drilling operations will have to be undertaken. There are cogent reasons for using the country's own resources of iron ore deposits at the Har-Ramim area in Galilee.

An expansion scheme has been worked out to increase the production of the Dead Sea works by 400,000 tons of potash per annum above the present capacity. This programme includes also the manufacture of 80,000 tons of table salt, 60,000 tons of magnesium oxide, 2,000 tons of magnesium metal, and 5,000 tons of bromine and bromine compounds

above the current output, per annum. It is estimated that the total investment required for the realisation of this extensive programme will amount to I£.100,000,000, i.e. equal to approx. £20,000,000 sterling. If the scheme is put into operation, it is expected to result in a 50 per cent cut in the cost of potash production, thereby placing the company in a strong competitive position.

It is emphasised that this scheme has been carefully prepared in great detail by the Dead Sea Works and has, in the meantime, been submitted to a close technical, commercial and financial examination by the authorities of the World Bank and by recognised experts and engineering firms abroad. Sir Ben Lockspeiser's report recommended that, if the investment capital can be found, the project should be carried out.

The flotation plant, installed by Negev Phosphates Company, has completed its running-in operations and is being brought up to capacity output of 30,000 tons a year. A relatively small additional investment may suffice to increase this capacity and the report has endorsed the Company's intention to that effect. The report has at the same time recommended that the combined production of high grade phosphate and soda ash be studied. Finally, it called for continuing the search for new phosphate reserves.

The report considered progress in the prospecting for flint clay in the Makhtesh-Ramon region of the Negev. Rather more than half of the drilling programme, recommended at the last meeting of the Technological Advisory Board, has been completed. It is essential to conclude the job, at an estimated additional cost of I£.250,000 (which is about £50,000 sterling). Research to find out how to reduce the iron content and upgrade the clay of the 7-meter band and also how to increase the saleability of the lower grades of flint by calcination, is now recommended.

In compliance with a recommendation at the previous Board meeting, geochemical research by the Geological Survey is now proceeding in co-operation with Israel Mining Industries Ltd. Considerable progress has been made and results of this work will be felt in many directions within a number of years. The Board therefore proposed in its recent report that the necessary financial resources should be guaranteed for the future.

D.S.I.R. GRANTS FOR UNDERWATER GEOLOGY AND GEOPHYSICS

In 1959, the Department of Scientific and Industrial Research increased the number of grants to universities and technical colleges for researches in every field of science except mathematics

During 1959 over 360 applications for research grants, totalling over £3,300,000, were received (compared with 204 applications, amounting to £1,350,000 in 1958). Of these, which include nuclear physics and human sciences, 295 (163 in 1958) were awarded, totalling £2,232,000 (£1,090,000). These grants for the purchase of equipment and employment of assistants, and other aid, are normally spread over a period of two to four years.

Of particular interest to mining are those for underwater geology and geophysics. One grant of £1,500 was made to Durham University for sea-borne geophysical work off the north-east coast of England in extension of land surveys in Durham and Northumberland. This work is being carried out by Dr. M. H. P. Bott. The survey includes an attempt to find out more about the eastern margin of the coalfield.

Another grant of £3,550 for underwater geological research was awarded to Bristol University. Professor W. F. Whittard is directing the investigation on the submarine geology of the continental shelf of the Western Approaches, English Channel, between latitudes 48½° and 50½°, leading down the Continental slope to depths of just under 3,000 fathoms. A geological map of the sea-bed will be prepared and the research techniques will include underwater photography including television camera scanning to depths of about 3000 feet.

A special research grant of £36,050 has been awarded to Durham University to sink a borehole at Rookhope, Co. Durham, to investigate the deep structure of the Pennines. The investigation will be led by Professor K. C. Dunham, F.R.S., head of the Department of Geology in the Durham Colleges.

Genetic studies of the mineralization of the Northern Pennines have led to the theory that granite is intruded into the foundation rocks. A recent geophysical survey by Dr. M. H. P. Bott and Dr. D. Masson-Smith has revealed a large steep-sided negative anomaly which suggests that the depth of the granitic stock is 3,000 feet with a suggested maximum of 5,000 feet.

The boring operation will produce valuable information on the Carboniferous and Lower Palaeozoic stratigraphical succession, and it may facilitate future exploration for useful minerals.

The Report of the Research Council of the Department of Scientific and Industrial Research is published by H.M.S.O. price 4s. 6d. (81 cents U.S.) by post 4s. 10d.

STEEL'S BIGGEST QUERY

How much steel will be needed fifteen years hence to satisfy world requirements ? It seems premature to attempt an assessment but in the eyes of the United Nations Economic Commission it is not too soon and they have gone so far as to forecast a rise of nearly 115 per cent in that period to an aggregate of 630,000,000 tons a year, approximately double the output attained in 1959.

If anything approaching that rate of progress is maintained the Commission warns the industry of a risk of a world shortage of iron ore. The report forecasts that Western Europe will need to quadruple net imports of ore by some 45-50,000,000 tons, and they have reached the conclusion that it is not too soon to do something about it.

The two representative authorities of British steel have not wasted their time in idle dalliance. Only a few weeks ago they announced the formation of the British Ore Investment Corporation to co-ordinate investments in overseas ore mining enterprises, primarily in West Africa.

The total capital involved amounts to £5,000,000 which entitles British steel to a participating share of the ore imports from Sierra Leone and Liberia. Obviously much ampler provision must be made to meet the expanding ore requirements of the United Kingdom steel industry.

A report was drawn up by the Home Ore Committee with the Iron and Steel Board, the Federation home ore producers, and foundry pig iron makers all represented in sponsoring " a major increase " in the rate of home ore production from 16,170,000 tons to well over 25,000,000 tons.

Plans, it is understood, have not yet been finalized. Presumably the bulk of the extra output from the Lincolnshire-Northants deposits will be required to feed the blast furnaces at Corby and Frodingham leaving the producers with ore terminals on the sea board to have free access to the imported ores.

Transport of these foreign ores will in all probability involve a re-appraisal of the industry's ore-carrying requirements. Hitherto the aim has been to develop the capacity of the ore carrying fleet to approximately one half of the total imports. To preserve the balance more and bigger carrying ships will be required which in turn will necessitate U.K. port facilities within near reach of the consuming plants.

THE IRON ORE INDUSTRY IN VENEZUELA

This review is based on an English translation of an article entitled "The Iron Ore Industry in Venezuela," which appeared in the Carta Semanal of the Ministry of Mines and Hydrocarbons, No. 57 of August 1, 1959, and is extracted from "Mineral Trade Notes".

RICH iron ore deposits south of the Orinoco River have been known since colonial times, but the first extraction of the ore was the mining of the Manoa concession in 1911. This concession is near the Orinoco River, 50 miles from the Atlantic Coast. George Turnbull, the holder of the concession, acquired it in 1887. From this deposit, the Minas de Imataca, the Canadian Venezuelan Ore Co. mined almost 70,000 tonnes of iron ore before abandoning the operation in 1914.

During 1926 and 1927 Eduardo Boccardo claimed the El Pao Mines. This transaction was made under the Law of Mines of 1925, and these concessions were subsequently adapted to the Law of Mines of 1928 which is still enforced. These concessions, in the Piar District of the State of Bolivar, are owned by the Iron Mines Co. of Venezuela.

The Cerro Bolivar deposit was discovered on April 4, 1947, as a result of an intensive search for ore containing a high percentage of iron. The search was undertaken by the United States Steel Corp. The iron content of Venezuelan ores is considered one of the highest in the world.

The organised and large-scale exploitation of iron ore was begun by the Iron Mines Co., a subsidiary of the Bethlehem Steel Corp., in August 1950. In January 1954, the Orinoco Mining Co., a subsidiary of the United States Steel Co., began mining the Cerro Bolivar deposit.

Production in 1950 totalled 199,000 tonnes, gradually increasing to 2,296,000 tonnes in 1953. In 1954, production reached 5,421,000 tonnes, of which 3,109,000 tonnes was produced by the Orinoco Mining Co. The trend in production for the subsequent years is a progressive increase until it reached 15,500,000 tonnes in 1958. Last year shipments by Orinoco reached a record 14,600,000 tonnes. From August 1950, when mining began, up to June, 1959, Venezuela's total iron ore production reached nearly 70,000,000 tonnes

Principal Deposits

The El Pao in the Piar District of the State of Bolivar, 45 kilometres south of San Félix embraces four plants: The Boccardo, Picacho, Gutiérrez, and Primavera. This ore deposit is operated by the Iron Mines Co. of Venezuela.

The Cerro Bolivar deposit, formerly La Parida, about 85 kms. from Cuidad Bolivar in the Heres District, is the country's most important iron ore deposit because of the magnitude of the high-grade reserve. It is operated by the Orinoco Mining Co.

Iron ore mining concessions as of December 31, 1958, were distributed as follows :

Iron ore mining concessions in Venezuela in 1958

	Hectares
Orinoco Mining Co.	10,593
Iron Mines Co. of Venezuela	8,600
Western Ore Co.	8,500
The Maria Luisa Ore Co.	6,000
Trans Western Ore Co.	6,000
Héctor Figarella	5,000
Oswaldo De Sola	2,000
L. González	2,000
F. Goetsch	7.5
TOTAL	48,700.5

Most of the area granted in concessions is in the State of Bolivar. This State, together with the following, constitutes the reserved zone for the mining of iron ore in Venezuela : Territorio Federal Delta Amacuro; the District of San Fernando in the State of Apure and part of the Districts of Miranda, Infante, and Zaraza in the State of Guárico; the Districts of Monagas, Miranda and Independencia in the State of Anzoátegui; and Sotillo in the State of Monagas.

The Reserve Zone

This reserve zone was established through four decrees of the National Executive. The first, dated March 11, 1939, covered all of the Territorio Federal Delta Amacuro and the Districts of Piar and Roscío in the State of Bolivar; the second, dated August 12, 1947, covered all of the territory between the Caroní and Aro Rivers, that is, the District of Heres in the State of Bolivar; the third, dated July 11, 1949, covered the Districts of Sucre and Cedeño of the State of Bolivar; and recently, on July 3, 1959, the following areas were declared national reserved zones for the exploration and exploitation of the ore: The District of San Fernando in the State of Apure and a strip of land 30 kms. wide, bounded by the left bank of the Orinoco River and adjacent to it, which begins at the northern boundary of the above-mentioned district and ends at the western boundary of the Territorio Federal Delta Amacuro. This strip covers part of the Districts of Miranda, Infante, and Zaraza in the State of Guárico, Monagas and Independencia in the State of Anzoátegui, and Sotillo in the State of Monegas.

Most of the 48,700 hectares granted in concessions were acquired through mining claims that were made by their holders prior to the executive decrees establishing the respective surrounding areas as reserved zones.

The proved and estimated reserves are distributed as follows :

Proved and estimated iron ore reserves in Venezuela, in million tonnes

	Estimated	*Proved*
El Pao Mines	—	86
Cerro Bolivar	300	402
La Grulla Group	—	22
Piacoa	145	125
El Trueno Group	70	80
Cerro San Isidro	2,384	327
María Luisa	50	—
TOTAL	2,949	1,042

At left, alongside, the bucket wheel excavator and mobile transfer belt. At left, below, a diagram of the bucket wheel excavator

Mining in the

NCHANGA Consolidated Copper Mines is the largest copper producing mine in Northern Rhodesia. The ore is produced from three sources, viz., Nchanga West orebody mined from underground, and two opencast workings known as the Chingola Open Pit and Nchanga Open Pit.

The Nchanga Open Pit orebody has a dip of 25-30 deg. and a strike of approximately 4,000 ft. The orebody is 60-100 ft. thick and is essentially made up of upper banded shales and feldspathic quartzites. The orebody is first encountered at a depth of 40 ft. and extends to a depth of over 800 ft.

Initially the ore was exposed by the use of three 6 cu. yd. shovels removing the overburden which was loaded into trains and rubber-tyred vehicles and transported to dumping sites. The ore so exposed is then blasted and transported to the mill.

The Nchanga Open Pit has to produce 80,000-100,000 tons of ore per month and owing to the dip of the orebody an ever-increasing quantity of overburden has to be removed. The ratio of overburden to ore, therefore, increases with depth and to maintain the required ore production, the average ratio of overburden to ore over a depth of 800 ft. is 9 to 1. This means that approximately 1,000,000 tons or 700,000 cu. yd. of overburden has to be moved every month. Railway trains, although comparatively economical to operate, have a very limited use with increasing depth due to track gradients being limited to 1½-2 per cent. Likewise, with main haul roads for rubber tyred vehicles, there is a limiting gradient of 7-8 per cent.

In order to excavate and transport large quantities of overburden to a dumping site at a distance of an average 2½ miles away, a bucket wheel excavator, conveyor system and mobile stacker were installed.

The Bucket Wheel Excavator

The excavator consists of a 20-ft. dia. wheel equipped with eight 1-ton capacity buckets mounted on the rim of the wheel. The bucket discharges the material towards the centre of the wheel from where the material is transferred to a conveyor belt, mounted in the bucket wheel boom, which in turn delivers the material to a second conveyor, mounted in the discharge boom and from there to the main conveyor system.

The base of the excavator is mounted on two 8 ft. 3 in. wide crawler tracks and carries the superstructure on a turntable which can rotate through 360 deg. The discharge boom, built into the superstructure, can swing through 185 deg. An 80-ton counter-balance weight is geared to the discharge boom and automatically compensates the out-of-balance loads due to the relative positions of the two booms. The excavator is 122 ft. long and 67 ft. high ; it weighs 408 tons, resulting in a ground pressure of 15.6 lbs./sq. in.

The wheel can be operated at 3 speeds giving 48, 60 or 72 discharges per minute and is rated at 1,500 tons per hour at the medium speed. In very favourable digging conditions outputs of over 3,000 tons per hour have been achieved. One European operator controls the digging operation and is assisted by an African in charge of the discharge boom and 3 Africans looking after cables, greasing and cleaning.

Method of Operation

The main conveyor is mounted on a bench leaving a bank of 53 ft. above the belt and has an overall length of approximately 4,000 ft. The cutting cycle consists of four passes, namely, (1) from east to west the excavator walks on an

intermediate bench 12 ft. above the belt excavating from a 41 ft.-high face approximately 90 ft. wide ; (2) from west to east the excavator operates on the same level as the belt and removes the 12 ft. bench. The excavator is then moved to the opposite side of the belt; (3) from east to west the excavator walks on a bench 17 ft. below the belt, cutting a 17 ft. by 90 ft. wide face ; and (4) from west to east, the excavator remains on the 17 ft. level and, making a low cut, removes the next 16 ft.

On completion of the cycle, during which a total block of ground 86 ft. x 90 ft. x 4,000 ft. has been removed, the conveyor belts are moved up to the face and the cycle is repeated. Alternatively the bench conveyors and excavator are moved to the next bench down, where the operation is repeated. For greater flexibility and increased range a mobile transfer belt is sometimes used between the excavator and the bench conveyors.

The Conveyor System

The conveyor system consists of two track mounted movable bench belts A and B, each approximately 2,000 ft. long, which are directly loaded by the excavator. Conveyors C.1, C, E and F are of similar design but are fixed belts and convey the overburden from the pit to the dumping site. Conveyor H is also a track mounted movable conveyor 3,000 ft. long. The overburden is transferred from this belt via a tripper to the mobile stacker.

The 48-in.-wide conveyor belt system running at 800 f.p.m. is designed to convey 2,860 tons per hour. The initial lift is 170 ft. increasing by 86 ft. steps as the pit gets progressively deeper. The conveyor drives are made up of combinations of 130, 175 and 250 h.p. units consisting of motor, automatically controlled scoop type fluid couplings and gearboxes. Several drives totalling 630 h.p. are in use.

The Stacker

The stacker is a crawler mounted conveyor system consisting of three belts, namely (1) a receiving 54 in. belt fed via the tripper on Conveyor H and a receiving hopper; it operates at 690 ft./min.; (2) a short transfer 48 in. belt operating at 945 ft./min., and (3) a 48 in. discharge belt mounted in the discharge boom and operating at 1,120 ft./min. The overall weight of the machine is 388 tons and it is mounted on three 8 ft. 3 in. crawlers giving a ground pressure of 10.38 lbs./sq. in.

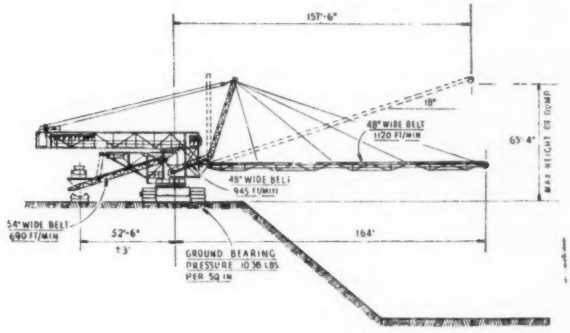
The superstructure is mounted on a turntable and can rotate through 360 deg. The receiving boom, including belts (1) and (2) rotates with the superstructure. The stacker has an overall height of 65 ft. and a length of 210 ft. The discharge boom is 150 ft. long, can be elevated to a height of 63 ft. and swings through an arc of 200 deg. within the superstructure. The stacker is operated by one European assisted by 2 Africans who look after the cables, greasing and cleaning.

Method of Operation

The dump conveyor H and stacker are mounted on a preformed bank 60 ft. high. The stacker discharges the overburden over the open N face of the dump. On completion, the stacker is moved to the S side of the conveyor and does a high stack. Once this area is filled to a height of 60 ft. the conveyor is moved 135 ft. towards the N face of the dump and the cycle is repeated. Each cycle has a capacity of over 2,000,000 cu. yd.

Nchanga

Open Pit



At right, above, a diagram of the stacker. At right, alongside, the stacker on the dump during the high-stacking operation

MINING IN GREECE'S FIVE-YEAR DEVELOPMENT PLAN

Greece's five-year economic development programme, in its final form, has been set out by a team of Italian experts under Professor P. Saraceno, chairman of SVIMEZ. This article outlines the government's plans for the mining and metal industries

THE Government of Greece attaches particular importance to the country's industrialization, for which it follows two basic guiding principles : First, it undertakes the initiative to step up the establishment of a series of key industries and other large plants which should help directly or indirectly to the achievement of the programme's objectives through the country's natural resources being put to profitable account and through the extension of existing industries or the creation of new ones. Government activity will give support and will supplement private enterprise in the sense that, when the latter fails to manifest itself—due to the high cost of financial and technical surveys, to the lack of transport network and of related industries, and also to the inability to procure large funds—the government will offset the aforesaid shortcomings so as to step up the establishment of big industrial plants. This means that only should private enterprise continue to abstain from the establishment of a specific industry, would the government step in and take over the initiative for its establishment. A newly-set-up corporation, the Industrial Development Corporation, will be the medium through which this effort will be conducted, acting either on its own or in collaboration with private businessmen.

Second, the government will concentrate its effort on supporting private enterprise, on the one hand, through assessing and stressing possibilities for the extension of existing industrial plants, and the creation of new ones, and on the other hand through the application of a policy of incentives to induce private entrepreneurial activity to undertake investments in industry of a productive nature.

In applying this policy (establishment of key industries and adoption of incentives), the government takes two basic considerations into account : (1) The need to achieve a more balanced development of the various regions of the country through the setting up of viable industries in various industrial centres throughout the country, which industries will chiefly use natural resources of the respective areas and the available labour force in the district. (2) The need to promote the country's participation in Europe's economic integration. This necessitates the creation of industrial units capable of producing under similar or even better conditions as other European industries so that they may be fully competitive.

Mines, Quarries, Salt Works

The net product of mines increased by 50 per cent between the years 1955-1959, reaching Drs. 1,050,000,000 in 1959, compared with about Drs. 700,000,000 (at the 1959 value) in 1955. This has helped to increase employment by 28 per cent bringing about a substantial increase in productivity. Exports of this sector increased from $10,700,000 in 1955 to $14,700,000 in 1959 in spite of the international recession. Ninty per cent of the output of mineral ores is exported abroad.

Chief objective of this programme is to exploit fully the country's natural resources. The exploitation of the mineral wealth is of particular importance because it will make expansion of the country's industrial structure possible.

To this end the government has set two objectives : (1) The creation of key metallurgical and other industries based on the use of indigenous mineral resources. (2) A comprehensive programme will be carried out to ascertain the true volume and composition of available mineral ore deposits and other mineral resources of Greece. To further this aim, the Greek Institute for Geology and Subsurface Research will be reorganized and given better equipment. Furthermore, contracts have been concluded with foreign firms granting them concessions for prospecting for oil, natural gases and lignite deposits.

According to the plan, the development of mining for the next five years will be as follows :

Barytes : Production has been greatly increased, soaring from 20,000 tonnes in 1955 to 160,000 tonnes in 1959. Internal consumption is very low (2,500 tonnes) and there should be an increase in the next five years of around 10,000 tonnes, linked with the search for petroleum. A substantial increase in exports is expected to result from the establishment of a plant for the production of concentrates, of 25,000 tonnes capacity.

Bauxite : The production of bauxite has increased from 500,000 to 860,000 tonnes during the past five years. Due to the greatly increased demand forecast for the next five years, production is expected to reach 1,000,000 tonnes per annum. The government plans to establish a national aluminium industry, capable of facing international competition.

Ferrous ores : Output and exports during the last two years were lower than in previous years due to the international recession. Production over the next 5 years will increase to 550,000 tonnes per annum, of which 400,000 tonnes will be for home consumption, on the basis of the proposed programme of key industries.

Manganese : Exports of manganese ores, particularly pyrolusite, showed a constant increase in recent years, which increase can continue through the establishment of new units for the beneficiation of poorer ores. Today's production of manganese is 20,000 tonnes approximately ; internal consumption is very limited, and is mainly used by the electric batteries industry. The government is studying the establishment of a ferro-manganese metallurgical industry.

Chromite : The excavation of this ore will be increased from 65,000 tonnes to 120,000 tonnes by the year 1964.

Nickel ores : It has not been possible to export the production of the Larymna plant's ferro-nickel because of low prices in the international market and of technical problems involved, regarding the nickel content of the concentrated ore. Prospects are good for the successful application of a new method which should yield 4,000 tonnes of nickel and 90,000 tonnes of steel annually.

Iron pyrites : Output and exports showed a downward trend in recent years, due to the fall in the international price of sulphur. Internal consumption absorbs about 90,000 tonnes, used for the production of sulphuric acid for the fertilizer industry. With the establishment of new industries, larger amounts of iron pyrites may be absorbed in Greece eventually.

Emery : Disposal in the world market is encountering difficulties, due to competition by synthetic abrasives. Beneficiation of the ore to increase its corundum content to over 90 per cent should render possible the export of 10-12,000 tonnes yearly.

Asbestos : A U.S. company, Kennecott, will build a factory in the Kozani area worth $14,500,000. Annual production

will be increased to 30,000 tonnes, mostly for export. Domestic demand should derive from the establishment of an asbestos cement industry.

Sulphur Mixtures : Output of the two mines (Laurium and Cassandra) yields concentrated lead and zinc ores, which are exported, as well as lead and its by-products (minium, litharge, arsenite), by the Laurium works. The production of concentrated zinc ore, amounting to about 29,000 tonnes, can be doubled through the operation of a further two mines in Thrace and Thassos.

Magnesite : The present output (about 90,000 tonnes in 1959) is exported either in its natural condition or in the form of caustic or dead-burned magnesia. Domestic consumption which is at present low (about 3,000 tonnes) may be increased through utilization of the product for the production of insulating materials. A further increase in output, expecially of dead-burned magnesia may result from existing possibilities to step up exports.

The rapid development in the output of *salt works* is dependent on the conclusions of a survey for the establishment of a soda industry. The production of soda will be increased from 100,000 to 300,000 tonnes by 1964. A notable increase is expected in the output of quarries, coupled with the activity of the building and construction industries.

The important development of this sector justifies prospects, on the basis of conservative estimates, that the total product of mines, quarries and salt works will increase from Drs. 1,050,000,000 in 1959 to 2,000,000,000 in 1964 (annual rate of increase 13.8 per cent.

Key Industries and Major Plants

Within the pattern of its industrial policy which has been set out above, the government has assigned the drawing up of technical and financial surveys—on the basis of the recently signed Greek-German accords—to assess the possibilities for the establishment of a series of key industrial plants. These are :

Iron and Steel : Consumption of steel products rose from 240,000 tonnes in 1955 to 362,000 tonnes in 1959—an annual rate of increase of 10.8 per cent. By 1964, steel consumption is expected to rise to 600,000 tonnes—an annual rate of increase of 10.7 per cent—an increase which creates favourable conditions for the setting up of a domestic steel industry.

Domestic steel production in 1959 was 66,000 tonnes ; the furnaces using as raw material scrap iron and imported pig-iron. This method is not the appropriate one for a substantial increase in production, as it would require a large increase in imports of raw materials which renders new production disadvantageous. In view of the fact that Greece exports iron ores, the government aims at setting up a fully-fledged steel production unit.

It is estimated that local iron ores can give 170,000 tonnes of steel per year, while the new nickel production method applied at Larymna can give a further 90,000 tonnes per year.

Aluminium : Despite the anticipated great increase in consumption of aluminium from the present level of about 3,000 tonnes, an aluminium industry cannot only be based on the local market, as it should have a yearly production of at least 50,000 tonnes which corresponds to 100,000 tonnes of alumina and 250,000 tonnes of bauxite. To this end, the government will shortly assign to a foreign firm the drawing up of a relevant survey. Simultaneously, the government has started consultations with foreign firms for the setting up of the unit either by one of these firms or in collaboration with the Industrial Development Corporation and other Greek enterprises. Such a solution would facilitate the placing of the product in the foreign market, since this industry will produce mainly for export.

Iron Alloys : Consumption in Greece is low (1,000 tonnes per annum), but a steady increase is expected to take place simultaneously with the development of key industries (chemical, mechanical engineering, and metallurgical). The benefit as regards foreign exchange which will ensue from the export of ferrous alloys, on condition that metallurgical industries utilizing the beneficiated local chrome and manganeze ores now being exported are created, will be great. Prospects are favourable due to the existence of sufficient deposits of good quality ores and also to the fact that there are possibilities for the required amount of electric power being made available at low cost. The government has assigned to the German firm of Dr. Lueth the drawing up of a relevant survey for the organization of mines, suggestions for new research, and for the method of industrial exploitation of manganese ores. As regards chrome ores, a private enterprise has already been financed to undertake prospecting—to be carried out by the Greek Institute of Geology and Subsurface Research—to assess the deposits and qualities of chrome ores, with a view to establishing a ferro-chrome industry.

Zinc Industry : Consumption nowadays amounts to about 3,000 tonnes per annum, chiefly for the production of galvanized metal sheets, piping, wires, etc. Owing to anticipated expansion in consumption, especially in the steel industry, the establishment of a zinc metal works is profitable. The government has assigned the drawing up of a survey for the establishment of a plant of an annual capacity of 7-10,000 tonnes of metallic zinc, to the German firm of Winterhager.

Basic Refractory Materials Industry : In view of the anticipated rapid expansion in demand for these products, resulting chiefly from the development of metallurgical industries, the government has assigned to the German Didier Werke firm the drawing up of a survey for the extension of existing installations.

The supply of sufficient and inexpensive power will contribute effectively to the reduction in cost of production and to the establishment of new industries, especially those based on low-cost power being available, which would make it possible to maximize other natural resources, such as mineral ores, to make headway with the substitution of imports and, finally, to promote exports. The development planned for the various sources of energy, to meet expanding consumption over the coming 5 years, will be as follows:

Solid Fuels

Lignite : Greece's large lignite deposits make it possible to meet, to a large extent, the country's power requirements through the development of local natural resources. Moreover, this source of energy, apart from helping the country save foreign currency, also creates permanent jobs in some of the country's less developed areas.

The first big steam-electric plant constructed within the framework of the country's economic development—that at Aliveri—was based on the use of lignite produced in that area. For that reason, the government has programmed, constructed or is carrying out the following projects in that region : (a) lignite mining installations ; (b) a 195,000 kW steam-electric plant ; (c) a factory for the production of lignite briquettes of an annual capacity of 200,000 tonnes ; (d) a small steam electric plant of 10,000 kW for production of steam ; (e) a complex of factories for the production of nitrate fertilizers.

It is estimated that total consumption of lignite will reach 6,600,000 tonnes in 1964, as compared with 1,400,000 in 1959.

To meet these needs, the 1960-64 programme foresees :

The extension of the Ptolemais lignite mines. Originally planned for yearly output of 2,100,000 tonnes to meet the needs

of PPC's first steam-electric unit of 70,000 kW and for the production of briquettes and semi-coke. Following the addition of PPC's second steam-electric unit of 125,000 kW, and the construction of the nitrate fertilizers plant, this region's yearly lignite requirements will reach 4,800,000 tonnes by 1964. To meet these requirements, extension of the mines and procurement of additional equipment are provided for.

Development of the Megalopolis Lignite Minefields. Prompted by the PPC, the Greek Institute for Geology and Subsurface Research carried out preliminary prospecting in the region, which after 38 drillings resulted in the assessment that there are some 200,000,000 tonnes of low-grade lignite, appropriate for opencast mining, for the supply of cheap fuel for the PPC's steam-electric plants. The proposed establishment of a thermo-electric plant at Megalopolis, in lieu of other units being added at Ptolemais, presents serious advantages from the point of view of achieving an equilibrium in the power network, and also from the aspect of bringing about the development of one of the least developed areas of the country. Within the framework of German technical aid, the drawing up of a preliminary survey has been assigned to the West German firm of Dr. O. Gold.

Other solid fuels : The creation of a lignite briquettes factory at Ptolemais now makes it possible to meet part of the needs of the railways by the use of locally produced fuel, as a result of which coal imports were reduced by 60,000 tonnes. Of the total briquette output of 200,000 tonnes, 120,000 will be used by railways and the remaining 80,000 by industry. Demand for coal and anthracite is expected to go down to 105,000 tonnes by 1964, as compared to the 1959 consumption of 170,000 tonnes.

Petroleum Products

The greater part of the country's requirements in petroleum products is scheduled to be covered by the output of the Greek State Oil Refinery at Aspropyrgos.

The refinery's output target as far as benzine is concerned is 225,000 tonnes per annum and it will process 1,700,000 tonnes of crude oil yearly.

According to estimates, consumption of butane gases will reach 25,000 tonnes by 1964, as compared with 11,000 tonnes in 1959. To cover the total needs, the 5-year programme foresees the equipment of the refinery with installations for the processing of emitted fuel gases. The project in question is expected to be put in operation within 1960.

As regards gas consumption, its decrease is expected to continue, so that by 1964 it should be equal to about 11,600,000 cubic metres, as compared to 12,500,000 in 1959.

Minerals from the Sea

This article is condensed from "Mobil Industrial Review", Vol. 3, No. 1

MINING from land out under the sea is a fairly common operation, and several mines are currently working deposits some miles offshore. Some mines, in fact, are completely remote from land. Typical of these is the sulphur mine off the Louisiana coast — the first completely offshore operation in the industry. At this mine the steel island is in 50 ft. of water and sulphur deposits 2,000 ft. below the surface of the sea are extracted by the Frasch method in which sulphur made molten by high pressure hot water is piped to surface.

However, the recoverable mineral wealth beneath the sea is but a fraction of the potential wealth contained within the sea itself and on the sea bed. As conventional mining operations increase in cost serious thought is currently being given to the possibility of commercially exploiting this vast storehouse of minerals.

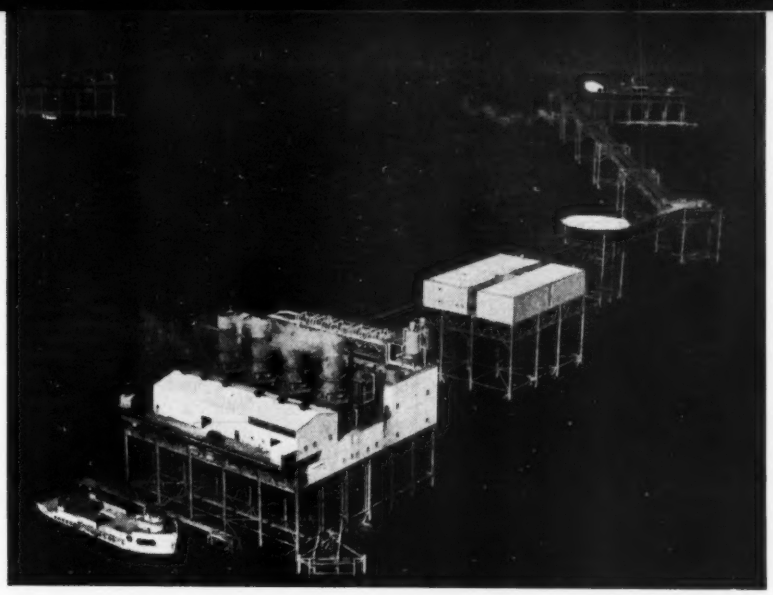
The most abundant wealth of the sea — dissolved salts in the water — is a bequest of the land. Over eons of time, rain, erosion and the flow of rivers have unceasingly carried the minerals of the earth to the sea, salting its waters with what is now estimated to be 50,000,000,000 tons of dissolved materials. Predominant are sodium chloride or common salt, magnesium, calcium and potassium. These account for more than 99 per cent of the salts.

Magnesium, the lightest of the metals, is of great importance in many branches of industry, such as in the production of alloys, electric batteries and particularly the aircraft industry where its lightness, strength and malleability make an essential contribution. The concentration of magnesium in sea water is appreciable, and 1 lb. of magnesium can be extracted from 150 gallons. The sea therefore provides a ready source of magnesium and although the processes which have been developed for its extraction are both expensive and complex they are an economic success and are far easier than the direct extraction of magnesium from minerals. In Great Britain, where the Steetley Magnesite Co. of Hartlepool obtains refractory grade magnesia by reacting dolomitic lime with sea water, the British Refractories Industry is no longer dependent upon imports of mineral magnesite.

The Steetley Co's plant is situated on the north-east coast of England, a location chosen for its nearness to a plentiful supply of dolomite as well as for access to the sea. Both the magnesium in the dolomite and the magnesium from the sea water are extracted in the process whose end-product is magnesia.

Washed and graded dolomite from the nearby quarries is calcined to dolomitic lime or "dolime", and transported to Hartlepool, where it is first slaked with fresh water to a fine dry powder in a hydration plant, and then made into a slurry for easy handling and to simplify mixing with sea water. Supplies of sea water are pumped directly to storage tanks from where the water is fed to the main reaction tanks after being pre-treated to remove calcium bicarbonate. Here it is mixed with the dolime slurry and magnesium hydroxide is formed as a precipitate. There are three reaction systems at the plant. Each consists of two cylindrical reaction tanks fitted with agitators and one settling tank fitted with a continuously rotating thickener mechanism. Together the three reaction systems process 30,000,000 gallons of sea water every day giving an output of 3,000 tons of magnesia per week.

One of the consistent finds of oceanographic expeditions has been chunks or nodules of rock from the ocean floor that



Commercial operation has begun at the world's first offshore sulphur mine, the largest steel structure ever erected in the ocean. Located seven miles off the coast of Louisiana in the Gulf of Mexico, the one-half-mile-long structure is the principal part of a £30,000,000 Freeport Sulphur Co. project to mine the major new sulphur deposit Grand Isle. Units of the island are : the heating plant where boilers, air compressors, pumps and generators supply the necessary mining "tools"; the employees' housing facilities which can accommodate 120 men and contain TV and recreation rooms, kitchen, cafeteria, first-aid room and offices ; a heliport ; and at the far end, the drilling and production platform. The separate drilling installation at the left sinks wells to relieve the orebody of excess mine water

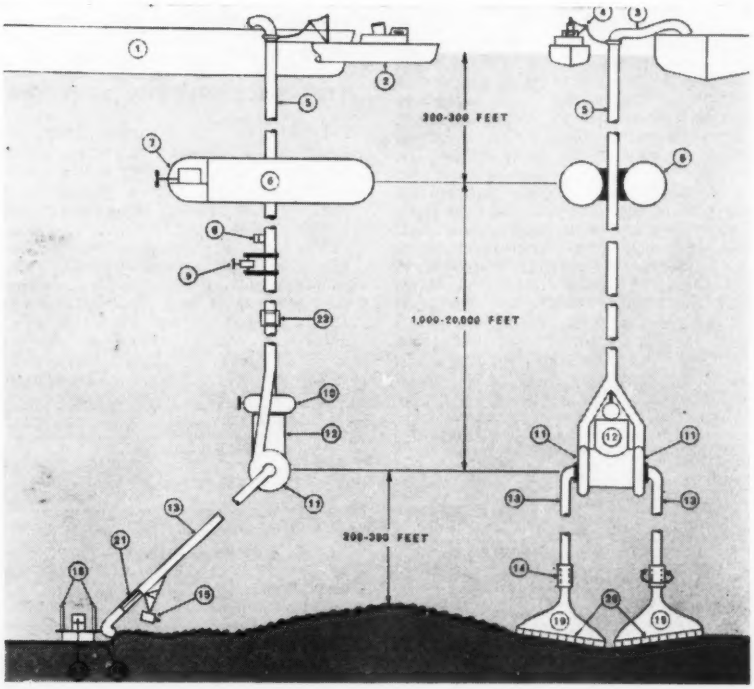
contain manganese, iron, cobalt, nickel and copper in varying concentrations. The presence of the nodules has been discovered over wide areas of the ocean floor, principally in the Pacific Ocean between South America and Tahiti.

The concentration of nodules and their wide distribution are the basis for estimates that the oceans contain up to 198,000,000,000 tons of the nodules. In this quantity, nodules that yield even very small percentages of manganese, iron, cobalt, nickel, and copper would provide an enormous supply of these metals. The average grade of nodules found on different parts of the sea bed contains 20 per cent manganese, 15 per cent iron, and 0.5 per cent nickel, copper and cobalt.

Though nodule concentrations have been found in water less than 1,000 feet deep, it is likely that the heaviest concentrations lie at much greater depths, where a slower sedimentation rate favours nodule formation.

Mining the nodules commercially would require first the cost of designing and building dredging equipment that could work at 5,000-10,000 feet depths where known nodule deposits lie. In addition, there would be the cost of transporting the nodules to distant land-based processing plants. In the face of these costs, mining operations would have to be exceptionally productive and efficient to produce competitively priced metals for the market.

John Mero, a research engineer with the University of California's Institute of Marine Resources, has done extensive research on the location of the nodules and has assembled methods and equipment from many people for mining them. None of the proposed methods or equipment has been put to the test of commercial-scale operation, so that exact answers to questions of cost, efficiency, and production volume are not available. But the proposals are a beginning to what one day might be a necessary exploitation of the ocean's resources.



Two views of a proposed hydraulic mining dredge which could extract about 4,000 tons of manganese nodules a day. 1, Nodule collecting and storage barge. 2, Hydraulic dredge service ship. 3, Nodule transfer line of flexible rubber hose. 4, Electric marine cable. 5, Delivery pipeline. 6, Submerged, hydraulic-dredge floats. 7, Propulsion motors to move the dredge in the direction of dredging. 8, Gyroscopic control. 9, Propulsion motor for propelling dredge pipeline in direction of dredging and keeping the pipeline in vertical alignment. 10, Main propulsion motor. 11, Main hydraulic pump. 12, Main pump motor. 13, Suction arm pipeline. 14, Swivel arrangement that would allow the suction head to rotate around axis of suction arm. 15, Rotational TV camera. 16, Hydraulic rams. 17, Motor and pump to provide water flow for lifting nodules into the suction arm pipeline. 18, Skids to prevent suction head from sinking too far into bottom sediments. 19, The suction heads. 20, Screen to prevent oversized material from entering the pumping system. 21, Barred opening to vent water and fine sediment. 22, Backflow valve to vent the nodules from the pipeline in case of a pump or motor failure

Machinery and Equipment

The "Clearcall" Communication System for Mines

Hitherto the most general method of communication for mine locomotive drivers has been the normal mine telephone with, in some cases, reinforcement of the speech by amplifiers and loudhailer units at selected points. A reinforcement system can be quite effective for beaming speech down a roadway but it is likely to prove expensive for long roads since power must be provided for the amplifiers at each point. Also it is, in reality, a one-way communication system.

In order to increase the speed and efficiency of locomotive working, and at the same time provide a greater measure of safety in mine railways, the Electronic Apparatus Division of Associated Electrical Industries Ltd. has devised a system of "Clearcall" carrier-frequency communication which overcomes in a novel manner the difficulties mentioned, and provides an excellent two-way loudspeaking conversation channel for the locomotive driver and the despatcher.

The equipment, which is certified in accordance with mining regulations as intrinsically safe and flameproof, operates in the following way. Speech signals are transmitted by a modulated carrier-frequency in the 100 kc/s. region along an aerial wire which is strung along the roof of the mine road. The locomotive carries a receiver with a loop aerial which picks up the signal from the wire in the same manner as a radio receiver, i.e., without mechanical contact, and it is then amplified, demodulated, and passed to a loudspeaker in the cab. By similar means, a transmitting circuit enables the driver to acknowledge his despatcher's instructions and provide information as necessary to promote efficient working. The microphone and loudspeaker may be separate units, or a single loudspeaker-microphone unit can be employed.

For N.C.B. installations all the transceivers in the system are tuned to the same frequency, so that instructions and information are received simultaneously by all drivers. Equipments can be supplied, however, for operation on separate frequencies if desired, so that sectional working can be achieved. This facility may well be preferred for overseas installations, and in this connection a non-flameproof version is available.

The "Clearcall" equipment on the locomotive is operated by a transistor-inverter power pack driven from miners' cap-lamp batteries mounted in an intrinsically safe container. The static equipment is normally connected to the mine power supply at the selected operating point of the railway system. Seven locomotives at the Maltby Colliery N.C.B. Eastern Division, have been fitted with the equipment, and the extent of its operation may be assessed from the fact that no less than 1,000,000 tons of coal was moved by these seven locomotives in 1959.

The A.E.I. Clearcall system. Above, the system in use on a mine locomotive. Below, a diagram showing the principle of operation

TESTING CONVEYOR BELTS

Development of a rugged testing unit that submits conveyor belting to tensions far greater than any other testing facility in the industry has been announced by the Goodyear Tire and Rubber Co., United States.

The new $250,000 high-tension belt-life tester, will simulate conveyor operation at speeds up to 2,000 f.p.m. and impose stresses as high as 250,000 lb. on belting samples as long as 60 ft. and as wide as 60 in. As a result of the machine, Goodyear will be able to make a much more accurate evaluation of the life and performance of a belt under the most difficult conditions. It will also speed development of new belting for extremely high-tensioned conveyors used in some of the deeper coal mines, and to move heavy material such as iron ore.

Twin, 1,000-h.p. driving and braking motors will provide the speed and tension for the unit, which will have electronic controls for measuring belt tension, pulley speeds, input and absorption torque and reactions on belt supporting idlers. The testing unit is built by Adamson United Co., United States.

GAS TURBINE POWERS ORE HAULER

A 225-h.p. regenerative gas turbine engine, said to have more that double the power of a comparable piston engine per unit volume and approximately 70 per cent more power per lb. has been installed on a haul truck at Inco's Sudbury open pit. The engine is the GMT-305 Whirlfire, made by General Motors' Allison Div., and Inco has stated that this is the first time an automobile gas turbine has been used for open pit ore haulage. The engine has been described briefly in *Engineering and Mining Journal.*

The torque characteristics of the engine result in a broad h.p. curve which allows the turbine engine to be operated over a wide range of speeds with a minimum loss of power. The company also has said that the ability to maintain maximum h.p. over a broad range makes possible the use of fewer speed changes in the transmission.

Although the crushing plant at the Sudbury pit is only about 1,000 ft. from the shovels at the pit floor, the 32-ton capacity turbine-powered truck will have to travel almost two miles over a winding 8 per cent grade haul road. The GMT-305 engine has been started, after extended cold soaking, at about −45 deg. F. in about 30 sec. It can be started at temperatures as low as 65 deg. F. Approximately 30 lb. of nickel are used in the alloys of the prototype engine.

MINING MISCELLANY

The first 15,600 tons of iron ore of the total of 480,000 tons contracted has been shipped to Ferrostal of Essen, Western Germany, from the Dominican Republic. Special arrangements have been made to increase output following the German order. One thousand tons are currently being extracted daily from the Hatillo mine, and deposits at Mogote and Laguna, soon to start production, will provide a further 900 tons daily. Ferrostal may repeat their order in the future, and plans have been made for exploiting the estimated 6,000,000 tons of ore, averaging 65.5 per cent, over the next five years. A larger deposit located at La Trinchera, is reported to contain 50-58 per cent ore, and it has been suggested that this should be utilized by setting up a domestic steel industry at a later stage of industrial development in the Domincan Republic.

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It was reported at the opening of the International Congress held in London recently that British production of magnesite from seawater had made such strides in recent years that an exportable surplus was probable in the near future.

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Nearly 300,000,000 tons of ore has been mined at Butte, Montana, in its 95-year history, yet reserves are sufficient for at least 50 years more of operations, said Mr. E. I. Renouard, vice-president in charge of western operations for The Anaconda Co. The company has spent $80,000,000 in the last 12 years bringing in its new low-grade operations, and plans further expenditure at Butte, which include modernization of the metallurgical plants at Anaconda and Great Falls at a cost of several million dollars; a large deep-level hoisting shaft, initially to be 4,600 ft.; large haulageways to accommodate big cars in one-way traffic; and another openpit mining operation east of the big Berkeley pit.

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Mr. A. H. Sorenson, research geologist for Hecla Mining Co., has stated that the increasing use of geochemistry and techniques of isotopic anlaysis of ores and rocks in recent years has aided progress in large-scale structural interpretation of the geology of the Pacific Northwest. Analysis of Coeur d'Alene, Idaho, district ore samples yielded what was referred to as an "amazingly uniform" lead isotope ratio, indicating an average age of 1,400,000,000,000 years. Mr. Sorenson added that ores from the Sullivan mine at Kimberley, B.C., have been determined by the same dating methods to be of the same age.

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Two German experts have presented a report on a lead and zinc refinery to the Peruvian Government, in which they recommend the building of a refinery on the Avonmouth principle with a daily capacity of 150 tons of each ore. A total investment of $U.S.47,000,000 is envisaged by the experts, who calculate that this top priority scheme should increase Peru's foreign exchange earnings by $U.S.20,000,000 annually.

The U.S. Senate, by an overwhelming vote, approved an amendment that would close a so-called "loophole" in connection with percentage depletion allowances on certain minerals. The amendment was made to the Bill which would extend present coporate and excise tax rates another year after June 30. It provides that the depletion allowance deduction for tax purposes in the case of materials taken from the ground be applied only to the extraction process and not to the more valuable finished product. The Treasury estimated the immediate revenue loss from this loophole created by some recent court decisions would be $50,000,000 in the fiscal year 1961, but would eventually amount to as much as $600,000,000 a year.

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Total coal and oil production in Holland in 1959 was 12,012,000 tonnes and 1,773,000 tonnes respectively, compared with 11,880,000 and 1,621,000 tonnes in 1958.

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Large uranium reserves are reported to have been discovered in the Baruk mountains and the Dahr-el-baydar mountains of the Lebanon. West German experts say that their uranium content is relatively high, and the Lebanese Government hopes to start exploitation as soon as possible.

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The Philippines Bureau of Mines reports domestic output during 1959 of iron ore at 1,230,193 tonnes (dry), (1,098,732 in 1958); manganese, 34,804 tonnes (22,308); fireproof chrome ore 534,535 tonnes (381,821); and metallurgical chrome ore 118,953 tonnes (34,489).

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It is reported that important deposits of lead, zinc and copper have been discovered in the Matra Hills of Hungary, near Patka and Pakozd.

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It is claimed by authoritative sources in Essen that probable sales of coal in West Germany in 1960 will be 130,000,000 tons, or 10,000,000 tons more than in 1959. This increase would be made up by reducing pit-head stocks more than from production. A further reduction in the labour force of 30,000 is expected by the end of 1960. It is estimated that over 100,000 miners, 23 per cent of the working force, will have left between early 1958 and end 1960. There are currently only 988 unemployed miners, mostly elderly men with pension rights. At present the number leaving the industry is about five times as high as those joining it.

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A Portuguese industrialist is reported by Barclays Bank D.C.O. to have recently visited Jos with a view to the establishment of a smelting plant and the formation of a company in Nigeria to be called the Nigerian Embel Tin Smelting Co. Ltd. The cost of such a plant would be in the region of £500,000.

A New-Zealand state-owned company will investigate the possibility of an iron and steel industry based on the country's iron sands, without the originally-planned participation by private interests. Mr. Philip Holloway, Minister of Industries and Commerce, said recently that plans for a joint venture had been abandoned because of "insoluble differences". But the proposed government company will undertake the investigation, which is expected to take up to three years. Nominal capital of the company will be £250,000.

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Atlantic Coast Copper Corp. has decided to bring its property at Little Bay, Newfoundland, into production as soon as possible with a daily milling rate of 800 to 1,000 tons. Ore reserves are estimated at 2,610,000 tons averaging 2.11 per cent copper. Current copper producers in Newfoundland are Maritimes Mining Corp., which operates at a rate of 2,000 tons daily at Tilt Cove, and American Smelting and Refining Co., with a rate of 1,250 tons daily, is operating in the centre of the island.

★

Members of Chile's Instituto de Investigaciones Geologicas have found important deposits of copper in the interior of the Department of Iquique. The ore is claimed to be very rich and it will be about 18 months before its nature and extent can be reliably assessed.

★

The first commercial computer service in Africa is to be set up in Johannesburg by a new company, LEO Computer Services (Proprietary) Ltd., established by LEO Computers of London, the pioneers of commercial data-processing, and Rand Mines Ltd., and will be operating by April, 1962. The installation, costing over £250,000, will comprise a LEO III Computer, and will be equipped with a very large magnetic core storage system to facilitate the automatic handling of complex commercial problems. Input to the system will be by photo-electrically read paper tape and punched cards, and output by paper tape, punched cards and a high-speed printer operating at 50,000 lines an hour. Very high-speed multiple magnetic tapes with immediate automatic checkback will provide intermediate storage. Rand Mines is considering the processing of payrolls for their employees and stores-control for their mines in the Witwatersrand area. A wide range of technical problems, including ore-reserve valuations and assessments of the economics of mining operations, is expected to be handled by the new installation.

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The British Iron and Steel Federation's display at the British Exhibition, New York, now being held, represents over 300 companies in the U.K. who make or process steel in Britain. Costing £100,000, the exhibits demonstrate British achievements in technical advances in steelmaking over the past 200 years.

Metals and Minerals

Stretch-Out of U.K. Nuclear Programme

The U.K. Government's accelerated £919,000,000 power station programme, announced in 1957, is to be cut by £90,000,000. The main reasons, states a White Paper announcing the decision, are that coal has become more plentiful and oil supply prospects have improved. Another reason is the extent of the fall in the cost of producing electrical power from the new conventional stations.

The stretch-out should occasion little surprise and is, in fact, less drastic than previous reports had suggested. The new programme will give the U.K. about 5,000 mW. of nuclear energy capacity by 1968 as against a target of 5,000-6,000 mW. by the end of 1966 as scheduled in the 1957 programme.

The rephasing of the programme will be welcomed by the hard pressed Coal Board, but should not significantly affect current appraisals of long-term outlook for uranium producers. By 1975 power stations in the U.K. will be consuming the equivalent of some 125,000,000 tons of coal a year—well over double the present rate—and by the 1980's their annual requirements will reach the equivalent of 200,000,000 tons. In the long run, therefore, increasing supplies of nuclear fuel will be required.

The view expressed in the White Paper is that in about 10 years' time it should be cheaper to generate base load in nuclear stations than in conventional ones, provided that technological progress fulfils expectations. This concurs with other predictions that parity in the costs of the two types of electricity generation should be achieved about 1970. At the present time conventional power costs some 25 per cent less than nuclear power, but this is due to a fall in the cost of generating conventional power from new stations. The cost of nuclear power is also declining as anticipated, but the extent it must fall before the two curves cross has tended to increase.

Meanwhile, the Atomic Energy Authority is faced with a substantial loss, due in no small measure to the stocks of uranium secured to meet the 1957 programme. In the circumstances it is scarcely surprising that the Authority has withdrawn the offer, made in 1957, to Swaziland, Kenya, Uganda, Tanganyika and British Guiana, to buy uranium on a ten-year contract from the start of production. In any case, a 2½-year search for uranium in these territories has proved fruitless.

In the U.S., the Atomic Energy Commission's programme has received a temporary setback through a decision by a Court of Appeals that could slow up the national nuclear power programme. The tribunal ruled against the Commission's policy of allowing a company to go ahead with construction of a power-producing reactor before it had been finally proved that the device would operate safely. It has been a general rule in A.E.C.'s development programme to allow a company to proceed with construction simultaneously with final research and development, thus saving several years in the time required to place a prototype reactor in production. The tribunal's ruling might jeopardize the construction of other power reactors and A.E.C. has decided to appeal against it.

AUSTRALIAN MINERAL SANDS

Members of Australia's Mineral Sands Producers' Association at a recent meeting in Brisbane unanimously agreed that the industry should rationalize its activities with a view to obtaining a price increase in both rutile and zircon. The report states that the conference had been most successful and that it had been attended by almost 100 per cent of the industry. Much valuable exchange of information had taken place, and several constructive proposals aimed at solving the industry's present problems had been examined. It was further stated that working conditions had been set up to enable the industry to rationalize its activities, with a view to obtaining a price increase in both rutile and zircon. No indication was given, however, as to the measures which are being adopted to achieve these ends. The conference is to reconvene in a month's time.

The Australian beach sand companies have been facing difficult times, due primarily to saturation of the rutile market, only companies with assured contracts have been able to remain in operation. Several of the larger companies have substantially increased their throughput, and much has been done to improve operating efficiencies and reduce production costs.

NEW ANGLO-U.S. ALUMINIUM COMPANY

The battle between the four major North American producers to consolidate or extend their interests in the U.K. aluminium industry continues apace. The latest, but by no means the least interesting development is the announcement by Aluminium Ltd. and Enfield Rolling Mills of the joint formation of a new company to acquire the secondary aluminium smelter at Bradford, Yorkshire, at present operated by Enfield Rolling Mills Aluminium Ltd.

The new company, to be known as Alcan Enfield Alloys Ltd., will have an issued capital of £500,000, owned 50 per cent by Aluminium Ltd. and 50 per cent by Enfield Rolling Mills Ltd. It will produce from scrap and primary aluminium

LONDON METAL AND ORE PRICES, JUNE 23, 1960

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £190 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 10s. 6d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 250s. 5½d.
Iridium, £23/£26½ oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £22/£24 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28½/28½
Quicksilver, £70½/£70½ ex-warehouse
Rhodium, £45/£48 oz.
Ruthenium, £16/£18 oz. nom.
Selenium, 50s. 0d. per lb.
Silver, 79½d. f. oz. spot and 79d. f'd
Tellurium, 25s. 0d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	20s. 0d./21s. 0d. per unit, c.i.f.
Beryl (min. 10 per cent BeO)	210s./220s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
,, Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
,, Refractory 40%	£11 0s. 0d. per ton c.i.f.
,, Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1)	
Nb_2O_5 : Ta_2O_5	175s./180s. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	47s. 6d./52s. 6d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s/85s. per ton f.o.b Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 67s. 6d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. (f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£28 0s. 0d. per ton c.i.f. Aust'n.
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	156s. d./163s. d. per unit c.i.f.
Vanadium—	
Fused oxide 95% V_2O_5	8s./8s. 11d. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16/£16 10s. ton c.i.f.

a large range of foundry alloys not normally produced at the primary aluminium smelters of Alcan. Aluminium Ltd. will be responsible for marketing the alloys produced by the new company.

The link-up with Enfield gives Aluminium Ltd. its first stake in the U.K. secondary industry, which comes at a time when the foundry alloy market is steadily growing, its chief customer being the motor industry. Last month I.C.I.-Alcoa entered this expanding field through their acquisition of the private company Almin, whose chief subsidiary, International Alloys, is the U.K.'s largest manufacturer of aluminium foundry alloys. Enfield is at present a considerably smaller producer, but a major expansion programme is doubtless contemplated by the new partnership.

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Péchiney is reported to have reached an agreement with the French Government under which it will build an aluminium plant in Greece. The company has not disclosed its plans, and will probably refrain from doing so until the agreement has been finally concluded, but it is believed that the plant might have an annual capacity of 50,000 tonnes.

*

A/S Nordisk Aluminiumindustri, producers of aluminium semi-manufactured and finished goods, plan a considerable increase in capacity at their plant at Holmestrand, on the Oslo Fiord. The project, which will take five years to complete, will raise the firm's annual capacity of rolled products by 1965 from 12,000 to 24,000 tonnes, making the factory one of the biggest and most modern of its kind in Europe. The capacity of the Holmestrand plant is being increased in order to meet growing demand from the firm's traditional Scandinavian markets and to improve the firm's competitive position under the new European market conditions.

Nordisk Aluminiumindustri is a subsidiary of A/S Norsk Aluminium Co. (Naco), which is controlled by Aluminium Ltd. Naco operates an aluminium smelter at Hoyanger, West Norway, whose annual output capacity was recently raised by 50 per cent to 13,500 tonnes.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The undertone of the copper market continues firm and the upward trend in values has been well maintained. Tin and zinc prices have remained steady but the lead market has inclined easier. The firmness in copper has brought about some broadening in outside interest and business generally has been at a satisfactory level.

ALL EYES ON THE CONGO

The day to day developments in the situation in the Belgian Congo have continued to overshadow the copper market and whilst the undertone remains basically very satisfactory, prices tend to move with the news. Interest in the situation, therefore, after the granting of independence next week centres, particularly as far as copper is concerned, on the Katanga Province; the most recent arrangements for the future government of the Congo as a whole do nothing to remove the serious situation which could arise if the threat were carried out to set up a separate State to include this area. Whilst it may well be possible to keep all copper-producing operations at a normal level, difficulties in the movement of metal and consequent delays could arise as a result of dislocation on the railways and at the nation's one seaport.

With consideration of these factors as a background, European consumers have been steadily covering their requirements, which in the main have been met by the producers—with the result that premium electro has been moving slowly. The concern of consumers generally outside the U.S. about the political position in the Congo has been reflected in the May copper statistics, which show that deliveries last month to consumers rose 21,494 tons from April to 210,868 tons. This figure is a record, and compares with a 1959 monthly average of about 138,000 tons. Production of refined copper in countries outside the U.S. increased slightly to 174,297 tons compared with 173,350 tons in April and stocks also increased from 245,984 tons at the end of April to 247,002 tons.

The London market has followed a similar pattern to previous occasions in that the upward movement has been accompanied by a widening in the backwardation following a nominal rise of only 20 tons in the U.K. official warehouse stocks last week to 3,383 tons. Some "bear" covering still persists centring mainly on the July position whilst sellers of nearby have been reserved. U.K. consumption of copper in April showed a decline at 58,678 tons against 67,982 tons in March and stocks increased proportionately from 52,477 tons to 59,404 tons.

In the U.S. consumer buying continues slow as fabricators remain out of the market not only on account of the low rate of demand for their products but also in expectation of lower prices, although recent events in Africa have cast some doubt on the future level. Both the producer and custom smelter quotations have been held at 33 c. whilst dealers shade this price by ¼ c. for near delivery. The custom smelter buying price for scrap has increased twice during the week by altogether ½ c. and is currently quoted 25 c. basis No. 2 Wire.

The Belgian producers have also advanced their quotation from B.Frs. 33¾ per kilo to B.Frs. 34½. Production of refined copper in the U.S. in May declined to 147,050 tons compared with 153,053 tons in April, whilst deliveries were also lower at 108,266 tons against 129,663 tons. Stocks of refined copper increased slightly to 65,328 tons compared to 63,373 tons.

TIN REMAINS STRONG

A short strike in Bolivia added further support to the tin market during the week. U.S. and Continental enquiry has been at a satisfactory level whilst an advance in the London nearby quotation on technical considerations has widened the backwardation. Additional support for the market comes from consideration of the Congo situation and the fact that Banka tin will in future not be available to European consumers. It is generally expected that the refined tin resulting from the smelting operations of Indonesian ore in Malaya will find its way mainly to U.S. consumers, where this brand has a good reputation.

U.K. tin consumption in April of 1,774 tons showed a decline against 2,191 tons in March, but stocks were slightly lower at 10,349 tons against 10,677 tons. Stocks in U.K. official warehouses fell last week 27 tons to 8,576 tons.

On Thursday the Eastern price was equivalent to £796¾ per ton c.i.f. Europe.

PRODUCERS' LEAD STOCKS RISING

Whilst earlier in the year it appeared as if the voluntary curtailment of supplies to the world market by certain lead producers were beginning to have the desired effect in striking a better balance between supply and demand, it has become more apparent that with producer stocks rising, this is not the case. This, together with further selling in London of Continental metal, has brought about an easier and more unsettled tone in the market. Consumer demand, however, has been satisfactorily maintained although in common with the other metals U.K. consumption in April showed a decline at 28,148 tons against the March figue of 35,066 tons. Stocks increased to 50,363 tons compared with 41,248 tons.

ZINC "BACK" INCREASES

Zinc, on the other hand, has remained steady and although supplies of nearby metal are adequate, the backwardation had increased in the absence of selling pressure on the near position. April consumption of zinc at 28,069 tons against 35,268 tons in March declined and stocks increased from 51,064 tons to 54,491 tons.

Quiet conditions in both metals are reported from the U.S.

Closing prices were as follows:

	June 16		June 23	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£251½	£252	£257½	£258
Three months ..	£245½	£246	£247½	£248
Settlement ..	£252		£258	
Week's turnover	11,725 tons		10,425 tons	
LEAD				
Current ½ month	£73½	£73½	£71½	£71⅝
Three months ..	£73½	£73⅝	£72⅛	£72⅜
Week's turnover	6,900 tons		7,275 tons	
TIN				
Cash	£797	£797½	£797	£797½
Three months ..	£789	£790	£791	£792
Settlement ..	£797½		£797½	
Week's turnover	755 tons		945 tons	
ZINC				
Current ½ month	£90	£90½	£91¼	£91½
Three months ..	£90	£90½	£90	£90¼
Week's turnover	3,475 tons		5,125 tons	

Mining Finance

Pick of the Market ?

The yield of over 8 per cent available on the shares of Western Selection suggests either that some serious risk attends the company's operations, or that the company is entering a declining phase. In fact, of course, neither of the suppositions would be correct. As far as mining is concerned, the situation in Ghana is extremely healthy, and in any case, Western Selection has still non-profitable but distinctly promising interests outside Ghana. Among these are Genrico Nickel and Cordoba Mines in Canada, both of which are still in the development stage, and Nigerian Lead-Zinc Mining, the company formed to exploit the promising property held by Mines Development Syndicate. And any question of a decline is obviated by a glance at the report and accounts.

It is clear, therefore, that the market has not yet learned its lesson — that, in fact, Ghanaian shares are still at unjustifiably low levels on account of what must surely be recognized as an unreasonable fear of Ghana politics. Certainly no one could have spent more effort than Mr. C. J. Burns, Western Selection chairman, in attempting to rectify this. Over the past few years he has consistently drawn attention to the excellent atmosphere in relations between European mining companies and the Ghana authorities. Neither has he had to rely on ministerial protestations of friendliness. He has had such deeds as the timely and generous government loan to Amalgamated Banket Areas to establish his case. Yet, in spite of the troubled situation in South Africa which might well have led to some switching from Kaffirs to "jungle" shares, West Africans almost without exception remain at yields in double figures. Even Ashanti, the "blue chip" of this market, offers 10 per cent.

It is clear that only time will rectify this situation. Meanwhile as investments for income, West African golds would seem to have few superiors. Bremang, for example, offers over 9 per cent on the basis of the 15 per cent dividend paid last year. This year an interim of 10 per cent has already been declared, so that a substantial increase on last year's payment is virtually assured. The results for the following year should be even better. The shares, in fact seem to be on an eventual yield basis of about 15 per cent, which is patently out of line even with the presently inflated yields on Kaffirs.

SIAMESE TIN'S RESERVES

Although the reserves of Siamese Tin continue to increase in tonnage each year, it has been noticeable for some time, that values are on a declining trend, albeit slight. Mr. W. R. B. Foster, the chairman, refers to this in passing in his chairman's statement, and it is mentioned here because it appears to be the only blot on an otherwise impeccable outlook.

In 1959, Siamese sold a total of 1,763 tons, compared with 1,241 tons in 1958. This is a good recovery, but the current year's results may be even more striking. In the first quarter alone, exports were more than twice as high as in the corresponding period of 1959. Perhaps even more important is the fact that the improved price and sales during the later part of 1959 have permitted liquid assets to return to something like their former splendour after the period of strain in the early days of output restriction and low prices.

This provides the essential financial basis for a strong advance. The technical basis is provided both by the magnitude of the ore reserves, and also by the fact that the enforced period of idleness for some of the Syndicate's dredges has permitted their modernization without any loss in output. Prospecting, too, has been continuing unabated, and although no substantial tonnages were added to Thai reserves during 1959, useful progress was made towards joining some 11,000,000 cu. yd. of outlying ground to the Syndicate's main property at Kota Bahru.

POINTS FROM THE CENTRAL MINING MEETINGS

At the recent annual meetings of some of the gold producers in the Central Mining group, shareholders' questions triggered important comments on the prospects of the companies concerned.

At the City Deep meeting, for example, a shareholder asked the chairman, Mr. P. H. Anderson, whether future distributions could not be made as returns of capital. Mr. Anderson replied that he did not think that the stage for returns of capital had yet been reached, particularly as results from the deeper levels were distinctly encouraging. He also drew attention to the fact that since stoping at the lower levels will almost certainly be on the longwall system, development results quoted for the K.1 and K.4 shaft areas represent the full development footage, not just the payable footage. Mr. Anderson said that when the time for capital returns was more opportune, full consideration would have to be given to the interests of the majority of the shareholders.

On the following day, Mr. Anderson spoke at the Crown Mines meeting of the exploratory work in the deeper levels below the Vierfontein Dyke. Although this had disclosed some marginal values in the western portion of the mine, the results had not been conclusive up to the present. Development below the dyke was being continued and would be extended over a wider area. Mr. Anderson said that the extended deep level work could be carried out in the initial stages without extensive capital expenditure, but the period over which the work would be continued was dependent on the results obtained.

EVENTFUL YEAR FOR HENDERSON'S

It must be many years since Henderson's Transvaal Estates enjoyed such an eventful year as that ended last March. Substantial participations in the new Kinross mines were acquired by the group ; a one-for-seven scrip issue was made ; there was a difficult take-over of Witbank Consolidated ; and a record dividend was paid on the increased capital. These events also

LONDON MARKET HIGHLIGHTS

For part of last week, South African Gold share prices managed to stage a recovery. The movement was largely of a technical nature, professional bear-covering and option activity playing a large part. Business remained fairly small and prices were beginning to soften once more in the later dealings on Wednesday.

Even so, some reasonable recoveries had been achieved. Free State Geduld rallied 5s. to 115s. and West Driefontein put on 3s. 9d. to 78s. 9d. Loraine at 26s. were helped by hopes concerning the coming quarterly report and "Ofsits" reflected the generally better feeling in the O.F.S. group with a rise of 2s. 3d. to 72s. 3d.

Older mines remained steady to firm throughout ; in most cases stock is still in very short supply in this section of the market. In a brighter Finance group Anglo American improved to 147s. 6d. and General Mining regained 5s. to 90s. A feeling that the high yield of nearly 9 per cent on Gold Fields was discounting a great deal created some inquiry for the shares at around 68s. 6d.

Copper shares also rallied, but here again the movement began to slacken towards mid-week. Speculative buyers were taking the view that fears of what might happen when the Belgian Congo achieves independence at the end of this month had now been discounted in share prices. Chartered rose 4s. 9d. to 74s. 9d., Bancroft 3s. 10½d. to 20s. and "Tanks" 1s. 9d. to 32s. 6d. Nchanga (53s. 9d.) began to respond to hopes regarding the final dividend which will be due soon.

After a quiet start to the week, several good features later enlivened the Tin group. Easily the most outstanding move was the spurt of 15s. to a new peak of 115s. on Wednesday in Ayer Hitam following the news of a four-for-one scrip issue. Eastern buying played a large part in this and also in the rise of 1s. 9d. to 41s. 3d. in Tronoh. The company estimated in a circular outlining its proposed bid for Southern Tronoh that its gross profits for the first half of 1960 would be not very far short of those for the whole of last year. Southern Tronoh moved up to 22s. 6d. Siamese Tin, on the other hand, eased slightly to 16s. 6d. following the chairman's warning on taxation.

Lead-zinc share prices tended to move uncertainly. Consolidated Zinc once again were swayed by the erratic movements of the Industrial sections. But after dipping to 75s. 3d. the shares rallied to 76s. following the annual meeting. Similarly, New Broken Hill improved to 49s. 6d. Only Lake George remained consistently firm, rising several more pence to 4s. 1½d. with dealers at a loss to account for the move.

Elsewhere, Burma Mines at 1s. 9d. made a modest response to the unexpectedly sharp recovery in production at Burma Corporation which was disclosed in the March quarterly report.

Bank Rate was increased from 5 per cent to 6 per cent on Thursday.

serve as a microcosm of Hendersons prospects. It is well known that there are two main aspects to the business of the Hendersons group : operating coal mines and holding investments, particularly in gold mining, but also in industry and commerce.

On the coal mining side, the picture is brighter than has been the case for some time. The inland market has improved, but more important, the prospects for exports appear much better. This, combined with the possibility of reopening the old Ogies mine, which has now been made possible by the purchase of the neighbouring Witbank Consolidated property, must give rise to hopes that the company's profits from coal mining should soon begin to expand. Hendersons coal assets are now valued at more than £1,000,000 in the group's books.

On the investment side, too, the future looks cheerful enough. Although the slide in Kaffir share values has reduced the portfolio value by £60,000 from the £1,770,000 at which it stood at the end of March, this is by no means serious in relation either to the total holdings or to the excess of market value over book value. More important, in any case, is the fact that as income-earning assets, Hendersons' Kaffir shareholdings are more than paying their way, a situation which will improve still further when the promising Bracken and Leslie companies reach the dividend paying stage.

Extracts from the statement by Sir Joseph Ball, the chairman, are on p.750.

FOUR-FOR-ONE FROM AYER HITAM

A scrip issue from Ayer Hitam has been confidently expected for some time. This confidence was based on the fact that the issued capital — £305,000 — was almost ridiculously small in relation both to the assets employed and the profits earned. At the end of the last financial year, for example, net current assets exceeded the share capital by over 50 per cent, while fixed assets stood in the balance sheet at more than five times the issued capital.

The expected issue is now to take place. Apparently the board has been waiting for the new No. 2 dredge to reach its full digging depth and to begin operating profitably. This has now happened, and an issue of four new shares for every one held is to be made. This will raise the issued capital to £1,525,000, a figure much more in keeping with the size of the undertaking.

In their announcement of the forthcoming issue, the Ayer Hitam board make no hard and fast profit forecasts. This is not surprising, for now that the No. 2 dredge is operating profitably, the No. 1 unit is to be shut down for conversion to electric drive, the replacing of the pontoon, and the installation of jigs. During the period of closure, the board hopes that No 2 dredge will earn sufficient to make possible "a reasonable return" to shareholders. When No. 1 dredge returns to service, however, its capacity and efficiency will both be augmented and "this should be reflected in future profits".

YEAR-END IS PRONTO COPPER TARGET

According to Mr. R. D. Lord, managing director of Pronto Uranium Mines, Pronto's target is to produce copper concentrates from the Pater property before the year-end. Pronto purchased the assets of Pater last year. The Pronto uranium mine has been closed for some weeks in terms of the merger arrangement which combines all the Rio Tinto Blind River properties into a single company called Rio Algom.

So far, Pronto's operations on the old Pater property have been confined to a small amount of drilling — which has established the extension of the ore zone in depth — strengthening the headframe, and installing the hoist and compressors brought from Pronto. In addition, preparations for milling at Pronto are being pushed ahead.

Plans are for a milling rate of 500 tons per day, and new concentrating equipment, including flotation cells, thickeners and filters are to be installed in what was the Pronto mine dry. The old Pronto concentrating equipment is not to be used.

It is tentatively planned to ship concentrates from Pronto to the smelter at Noranda, Quebec, although no agreement has yet been signed. No effort will be made to extract the cobalt content of the Pater ore, which was formerly estimated at about 0.14 per cent, compared with about 2 per cent copper. The ore reserves indicated by the original owners totalled about 1,000,000 tons. Pronto's drilling has established more ore, and confirmed the grade.

Anglo Collieries Results.—For the year to June 30, the profit before tax of Natal Coal Exploration Company is officially estimated at £251,000, against £251,800 last year. The dividend rate of 8d. per share is unchanged. For S.A. Coal, the estimated profit is £465,000 against £426,174. This company's dividend rate is also maintained, in this case at 4s. per share.

Lake View Half-Century.—Lake View and Star has celebrated its half-century by making a gift of £5 to each of its 1,000 employees. Initially, Lake View and Star was formed as a consolidation of two older properties, Lake View Consols and Hannans Star. It later took over Chaffers G.M., Ivanhoe Gold Corp., Golden Horseshoe Est., and Associated Gold Mines of W.A. In its fifty years of existence, Lake View has produced bullion to the value of £42,613,000.

Dividend Hopes by Fabulosa.—In their report for 1959, the directors of Fabulosa Mines Consolidated say that unless something extraordinary happens, the company should be able to declare a dividend next September.

Mr. W. V. D. Skrine has been appointed a director of The Pahang Consolidated Company Ltd.

Mr. C. P. Green has been appointed a director of Spaarwater Gold Mining Company Ltd. in place of Mr. J. Boyd who died recently.

At the A.G.M. of Mason and Barry Ltd., Lt. Col. J. Cross Brown resigned from the chairmanship of the company, and Brigadier A. B. Clough, who retired in rotation, did not offer himself for re-election. Lord Cullen of Ashbourne and Mr. Clifford Whitley, who both retired in accordance with the company's articles, were not re-elected to the board. Mr. K. N. Engel was elected a director, and at a board meeting on June 17, Major P. N. Cross Brown was appointed chairman.

BIRTHDAY HONOURS

Knighthoods have been conferred on Mr. Percy Llewellyn, chairman, Hunting Group of companies; Mr. William Hunter McFadzean, president, Federation of British Industries; Mr. Basil Ferdinand Jamieson, director, Research Group, U.K. Atomic Energy Authority and Mr. Charles William Tachie-Menson, chairman, Ghana Public Service Commission. Col. G. G. Hargreaves, Bolton, chairman, N.W. Div. National Coal Board and Mr. R. B. McConnell, director of Geological Surveys, British Guiana have received the C.B.E.; O.B.E. awards include Mr. E. R. Gee, formerly director of Geological Survey of Pakistan; Mr. W. Pulfrey, Commissioner, Mines and Geology, Kenya; Mr. F. W. Roe, formerly Director of Geological Surveys, Sarawak; and Mr. A. R. Shaw, formerly Senior Inspector, Explosives Branch, N.S.W. Dept. of Mines.

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SIAMESE TIN SYNDICATE

LARGER SALES

The 53rd annual general meeting of the Siamese Tin Syndicate, Ltd., will be held on July 14 in London.

The following is an extract from the statement of the chairman, **Mr. W. R. B. Foster,** circulated with the report and accounts for 1959 :

The incidence of tin restriction again limited production from all our properties, though to a lesser degree than in 1958. During the earlier months of 1959, exportable allowances continued at a low level, but the position has since improved to the extent that the amount exported for the first quarter of 1960 was about twice as much as that allowed during the same period of 1959.

Sales of tin concentrates through normal market channels were 1,525 tons and we were able to dispose of a further 238 tons from stocks under an approved barter scheme. Total exports for 1959 were thus 1,763 tons compared with 1,241 tons during 1958.

The increase in our sales has resulted in a welcome rise not only in our profits but also in net liquid assets from the low level to which they fell during 1958. Having taken all the relevant facts into consideration we felt it would be inappropriate to recommend a final dividend and have decided instead to declare an increased interim for 1960 of 1s. per stock unit.

Taxation

Towards the end of the year under review there was an increase in the rate of Thai taxation from about 20% to about 35%. The increase, due partly to a rise in basic income tax rates and partly to the imposition of a new tax on profits remitted from Thailand, has not had much impact on the 1959 profits but it will be more serious in subsequent years. Whether the remittance tax will be allowed to rank for double taxation relief in the United Kingdom is still uncertain.

It will be noted that the accumulated contributions by the group to the Buffer Stock are £188,784. While the whole of this amount should eventually be repaid to us such a large sum is meanwhile a heavy burden on our financial resources.

There was a substantial overall rise in world, and particularly in European, tin consumption during 1959. Given a continuance of suitable conditions, there seems to be no reason why this improvement should not be maintained during 1960. The amount which producer members of the International Tin Agreement may currently export has in fact now reached a level which represents substantially full production for most mines and such restriction as remains is required to ensure the orderly disposal of accumulated stocks rather than as a curb on production. The International Tin Agreement has its critics and its friends but both would agree that it has played its part in stablizing prices during the past year to the mutual benefit of producers and consumers. The existing Agreement expires in mid-1961 and a new one to replace it is now being discussed by the United Nations. The International Tin Research Council plays a very active part in fostering new uses for the metal and in improving existing ones through the Research Institutes it controls in Europe and America. To anyone interested in this important programme of research and development I would recommend the Council's report for 1959.

International Wrought Non-Ferrous Metals Council

Delegates from the copper and copper alloy fabricating industries of thirteen non-Communist European countries were present when the general assembly of the International Wrought Non-Ferrous Metals Council met in Burgenstock, Switzerland, on June 18, under the chairmanship of Mr. W. Ertel of Germany.

The specialist committees of the International Council have had an active year. The Substitution and Development Committee has kept a close watch on cases of replacement of copper by other materials. In this connection, it has prepared estimates of the long-term effect of price on the consumption of copper and of the "peril points" at which the danger of substitution arises. The committee has also prepared estimates of future demand for copper and copper alloy semi-manufactures, as far ahead as 1970.

The Costing Committee has issued a *Guide to the Principles of Costing in the European Non-Ferrous Metals Industry* in English, French and German, which will be of great value to all members. A glossary of costing terms in the three languages is attached to the *Costing Guide* as an appendix. Copies of the *Costing Guide* are available to non-members at a price of 10 Swiss francs per copy.

The Statistical Committee has recently compiled statistics of the end-uses for copper and copper alloy semi-finished products in 1959. The committee is also taking steps to compile monthly statistics of the actual consumption of refined copper by members. These will be a great advance on the quarterly statistics (usually of apparent consumption) which are at present available, and they should enable both the fabricators and the suppliers of their raw materials to plan more effectively in the short period.

The International Council will be holding its General Assembly in France in June, 1961.

HENDERSON'S TRANSVAAL ESTATES

AN EVENTFUL YEAR

The 48th annual general meeting of Henderson's Transvaal Estates, Limited, will be held on July 13 in London.

The following is an extract from the circulated statement of the chairman, **Sir Joseph Ball, K.B.E. :**

The year which ended in March last proved to be an eventful one for your Company. A capitalization issue on a one for seven basis was made to members; substantial entitlements to shares in the new Leslie and Bracken gold mines were taken up at par by one of our subsidiaries; Henderson's itself acquired control of Witbank Consolidated Coal Mines Limited; and a record dividend on the increased capital has been declared for the year.

The past year was a particularly good one for investment transactions and the group profit under this heading increased by nearly £45,000. The group's investments, the present market value of which can be put at £1,770,000 (as compared with a book value of £1,090,000), are well spread, both on a geographical basis and on an industrial basis.

It will be seen from the Company's own profit and loss account that the year's dividends amounted to £146,000 gross, split into £47,000 for the interim of 4d. per 4s. share (8 and 1/3rd per cent) and £99,000 for the final of 6½d. per share. This final dividend of approximately 13½ per cent is payable on the capital as increased both by the one for seven bonus issue which was made to members in November and by the three for four issue to ex-shareholders of Witbank Consolidated and it must be noted that the latter company contributed nothing towards the group profits for the year under review.

Shareholders will no doubt expect me to say something about the future prospects of the Henderson group; but in doing so it will be necessary for me to refer to the disturbed political situation existing in the Union. Those of us who are engaged in the administration of mining companies operating there are naturally deeply concerned about this and about the heavy fall in the value of their shares which has resulted from it. My personal view is that this fall, particularly in the value of mining shares, has been greatly over done. It must be remembered that the troublesome areas have been almost exclusively urban in character and I have yet to learn of a single disturbance, however small, on any of the gold or coal mines in any of the groups with which I am connected or otherwise familiar.

You will have read that quite recently representatives of the Chamber of Mines and of other important employer organizations have jointly submitted to the Government practical suggestions aimed at easing racial tension, based of course upon their years of experience in handling hundreds of thousands of contented African workers. Let us all hope that these suggestions will be adopted and that more harmonious relations with the urban African population will speedily be established.

Now with regard to the Henderson group, I feel confident that, in the absence of further unforseeable political disturbances we should be able to maintain the present rate of dividend in the current year.

WESTERN SELECTION AND DEVELOPMENT

The thirtieth annual general meeting of Western Selection and Development Co., Ltd., was held on June 20 in London.

Mr. C. J. Burns, Chairman, presided, and the following is an extract from his circulated Statement :—

The profit for the year ended September 30, 1959, £133,867, representing an increase of £38,739 over that for the previous year, was the result of improved stock market conditions and satisfactory operating results from the Ghana mines which still form a substantial part of our investments. The market value of our quoted securities at September 30, 1959, was £841,470 an appreciation over book cost of £322,615. In the past few months share prices have generally fallen from the high level of 1959, but even so the market value today is substantially in excess of book cost.

The improved results for the year under review do, perhaps, justify a slightly increased return to Members, but taking into consideration the stage reached in the Company's Canadian investment, a similar distribution i.e. 8% less tax, is recommended. Your Board have kept in mind the finance required to continue operations in Canada and the necessity for retaining sufficient resources and flexibility to carry through all projected programmes.

Of the gold mining companies in Ghana in which we are interested, both Ariston Gold Mines (1929) Limited and Ghana Main Reef Limited have returned profitable results commensurate with expectations. Amalgamated Banket Areas Limited, whilst at the moment passing through a highly expensive and most necessary development stage, can view the future with greater confidence, thanks to the generous assistance given to it by the Ghana Government. Bremang Gold Dredging Company Limited has completed its final dredge moves and from now on can look forward to dredging operations unhampered by any major capital expenditure. The results from Ghana are likely to show even greater returns in the future, providing this Company with due recompense for its financial help and co-operation in past years.

For the past few years our Nigerian investments have been very much in the background, curtailed operations of the tin mining companies reducing the return that might have been expected on the Company's investments. With the recent relaxation of tin quotas, we can expect improved returns from our Nigerian investments.

Due to more favourable lead and zinc prices, Nigerian Lead-Zinc Mining Co. Ltd., the operating company of Mines Development Syndicate (West Africa) Ltd., has every possibility of proceeding to production in the fairly near future.

The Company's operations in Canada covering so wide an area require a development stage commensurate with the size of operation.

Your Company's affairs are now in a most interesting stage. In the past, investments in Ghana were considered to be a liability due to the uncertain future of that part of the world. In fact, over the past two years, our investments in Ghana by reference to stock exchange quotation have been strengthened rather than weakened. At the same time our interests in Canada have not yet progressed to the stage where they can contribute to the profitability of the Company. At the moment they must be considered purely as prospecting expenditure and the future must be left to results. Nevertheless, within the framework of a mining finance company your Company has progressed steadily, and given a reasonable return from even one section of the Canadian investments, sufficient resources will be available for even greater expansion.

The report and accounts were adopted.

THE KADUNA SYNDICATE

The 49th annual general meeting of The Kaduna Syndicate Limited was held on June 16 in London, **Mr. R. S. Mackilligin, C.M.G., O.B.E., M.C.** (the chairman) presiding.

The following is an extract from his circulated review :

In my review for the year 1958 I pointed out that, as the Company had built up its stocks of tin ore to approaching the limit permitted under the International Tin Restriction Scheme, output would have to be restricted to approximately the amount of permitted exports. Production for the year to December 31, 1959, amounted, therefore, to only 195 tons, being the lowest output for 26 years, and comparing with 233.5 tons in 1958.

Sales of tin ore during the year amounted to 189.375 tons as compared with 167.46875 tons in the preceding year, and slightly over 10 tons of columbite ore was produced and sold locally. The mining profit for the year amounted to £27,817 and there was a net profit for the year of £15,683 as compared with £10,938 in the previous year. It may be regarded as satisfactory that, despite the drastic restriction of ouput, the profits earned permitted the total dividend for the year being raised from 33.1/3rd per cent to 41.2/3rds per cent.

The degree of restriction under the International Tin Restriction Scheme has been further eased since the beginning of the current year and the output for the first four months amounted to 1044 tons as compared with 54 tons in the corresponding period of last year. It is hoped, therefore, that we have seen the worst and that we may look for an increased output and larger profit for the current year.

The report was adopted.

KADUNA PROSPECTORS LIMITED

The 45th annual general meeting of Kaduna Prospectors Limited was held on June 16 in London, **Mr. R. S. Mackilligin, C.M.G., O.B.E., M.C.** (the Chairman) presiding.

The following is an extract from his circulated review :

As foreshadowed in my review for the year 1958, the Company, having built up its stocks of tin ore to approaching the limit permitted under the International Tin Restriction Scheme, has had to restrict output to approximately the amount of permitted exports. Production for the year to December 31, 1959, amounted, therefore, to only 47 tons, as compared with 63.75 tons in the previous year.

Sales of tin ore during the year amounted to 47.3125 tons as compared with 41.8125 tons in the preceding year. The mining profit for the year amounted to £5,844, and there is a net profit of £3,486 as compared with £3,145 in the previous year. It may be regarded as satisfactory that, despite the drastic restriction of output, the profits earned permitted the total dividend for the year being raised from 25 per cent to 29.1/6th per cent.

The whole of the output of 47 tons was obtained from outside of the recorded ore reserves, which remain at 85 tons.

The degree of restriction under the International Tin Restriction Scheme has been further eased since the beginning of the current year and the output for the first four months amounted to 22 tons as compared with 12.5 tons in the corresponding period of last year. Increasing costs are a constant concern, but it may be hoped that, with an increased output, results for the current year will be at least as satisfactory as those of the year under review.

The report was adopted.

Personal

Mr. L. R. Verney has been appointed assistant consulting metallurgical engineer to the Rhodesian Selection Trust group of companies with effect from July 1, 1960. Mr. Verney is at present assistant smelter superintendent at Mufulira. For a thesis on work connected with the Mufulira reverberatory furnaces he was, in 1959, awarded an M.Sc. degree by the University of Wales. Mr. Verney is an Associate of the Institution of Metallurgists and an Associate Member of the Institution of Mining and Metallurgy.

★

For distinguished achievement in the science of metallurgy, Dr. Ernest O. Kirkendall, Secretary of the American Institute of Mining, Metallurgical and Petroleum Engineers, has received an Alumni Award from his alma mater, Wayne State University, Detroit, Michigan. The citation stated : " His research has brought him international fame as the discoverer of a phenomenon in diffusion in solid metals now known as the ' Kirkendall Effect '. His work has given impetus to the whole area of physics of the solid state."

★

The Aluminium Development Association announces that General Sir Geoffrey Bourne, K.C.B., K.B.E., C.M.G., has been appointed director-general to succeed Air-Commodore W. Helmore, C.B.E., who recently retired after fourteen years as director - general of the Association. He will take up his appointment with the Association in the middle of June.

★

Mr. J. D. Trustram Eve was elected president of the Royal Institution of Chartered Surveyors on June 13, 1960.

The Economy of Larger Shovels

Writing in *Mining Congress Journal*, United States, E. F. Hanson, geologist Salt Lake City District, has summarized the factors relating to the economics of using larger shovels in surface mining. The author has supervized plant construction, exploration and development of iron orebodies in Utah and Nevada for the Utah Construction Co.

The size of earthmoving equipment for strip mining is generally determined by a number of considerations. These include the following:

1. Total number of cubic yards of material to be moved and production rate.
2. Operational mobility.
3. Transportation equipment available for hauling.

Large capacity mining and stripping equipment costs a great deal of money to purchase, to erect and to move as well as to maintain. Therefore, the amount of material to be moved, more or less, is directly related to the investment required. When the amount of material to be moved is large and a high rate of production is required, there is no problem in selecting the most suitable size shovel. In most cases however, the equipment must periodically be moved to a new location.

The cost is determined, to a large extent, upon the mechanical handling equipment available. It has been found desirable to have two 25 to 35-ton cranes available for the dismantling, loading and erection of the 6-, 8- and 10-yd. shovels

Large shovels must have haulage companions to match in order to attain maximum production. The most important thing is to keep haulage equipment cycled so that the shovel can work without interruption.

For the purpose of making a comparison between production costs of the 6- and 10-yd. shovels in loading three types of rock, the Iron Springs operation, where both medium hard iron ore is being mined and a moderate firm limestone is stripped, was used as a base. The cost of mining and stripping in hard abrasive rock at the Blowout was 10 per cent higher and the Bingham stripping cost using a 10-yd. shovel was 25 per cent lower.

Summary of Experience

Experience over a number of years using various makes and sizes of shovels in mining and stripping in Utah has pointed up the following:

1. The most important thing to keep in mind is keeping trucks under the shovel in order that it can work continuously. The size of the trucks is also important. For greatest output nothing smaller than a 22-ton truck should be used and preferably the 34-ton and 50-ton units. The larger units require a wide turning radius. If a short radius is used excessive wear on tyres will result.

2. Experience has shown in the company's operations that the larger shovels show a marked increase in availability. The smaller the shovel the more repair and down time, and more especially when digging in hard rock. The availability is largely dependent upon the working conditions. As would be expected, hard abrasive material causes more down time drilling and shooting is a most important part of the operation. A shovel cannot load efficiently unless the rock is properly broken. Powder is cheaper than repair parts.

3. The 6-, 8- and 10-yd. shovel can do almost anything the smaller shovel can do, and do it better and at a lower unit cost. In hard digging, the large units have a distinct advantage.

4. For maximum efficiency of operation an attempt should be made to keep the height of the working face between 25 and 40 ft. where 6-, 8- and 10-yd. shovels are used. When the shovel face does not exceed the height mentioned, it is possible to clean down the face, preventing sloughing, which provides safe working conditions and keeps muck and rocks from rolling into the shovel mechanism.

There is also an added advantage in drilling and shooting because there will be less burden at the toe of the face on the blast holes. In soft ground the edge drill holes will be in a safer position.

5. The lunch period should be utilized by mechanics to make an inspection of the shovel, and to make minor repairs. When shovels are working round the clock it is well to designate one day each month for careful inspection and repairs. Some repairs can be deferred and taken care of on the repair day.

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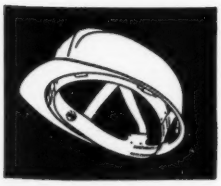

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Book Reviews

Economic Survey of Europe in 1959. *Prepared by the Secretariat of the Economic Commission for Europe, Geneva 1960. Price £1 1s.*

This year's Survey is divided into four parts. The first two chapters continue the traditional annual analyses of recent developments in the European economy which, together with the material in the quarterly *Economic Bulletins*, are designed to provide a continuing review of economic events in Europe and elsewhere which may significantly affect the frame work within which governments have to determine their economic policies. The renewed expansion in western Europe and the prospects for its continuation are discussed in the first chapter; and the rate and pattern of economic growth during 1959 in the economies of eastern Europe and the Soviet Union are reviewed in the second chapter.

Part II of the Survey is devoted to the new long-term plans—for periods of five or seven years ending in 1965—published during the past year in Czechoslovakia, Eastern Germany, Hungary, Poland and the Soviet Union. Following past practice, the opportunity has also been taken to focus attention in this Survey, in Parts III and IV, on some more general questions which are both of long-term importance and relevant to the current formulation of economic policies in European countries.

South African Electrical and Power Year Book. *Published by the South African Engineer and Electrical Review (Pty), Johannesburg. pp. 246, Price £3 3s.*

It is recognized that the relation between the number of units of electricity used and the total population of a country is a fair measurement of the standard of living, and the publishers are glad to record steady growth for electrical consumption on the Union of South Africa. With the commissioning of the Kariba hydro-electric power project this year, the general standard of living for Southern Africa will be raised considerably. In the Union, the latest report from Escom showed a 6.6 per cent increase in units sold.

The aim of the publishers of this Year Book has been to provide in one volume reference material needed by manufacturers and designers of electrical equipment, buyers for government departments and local authorities, electrical contractors, architects and electrical engineers in all branches of the industry.

United Nations Statistical Yearbook, 1959, *obtainable at the U.N. Bookshop or Columbia University Press, 2960 Broadway, New York 27, N.Y. U.S.A. pp. 618, Price $10 clothbound and $8 paper bound, or equivalent in other currencies.*

The volume of industrial activity of the world rose to a new post-war high in 1959, according to the new issue of the U.N. Statistical Yearbook. The level of world industrial output in 1959, excluding Eastern Europe and mainland China, was about two and one-half times that in 1938 and substantially above the 1957 level, the previous high point in industrial activity.

The new issue of the Yearbook was prepared by the Statistical Office of the United Nations with the active co-operation of the statistical authorities of some 150 countries and territories and with the help of UN specialized agencies and other governmental bodies.

The volume of activity of each manufacturing industry of the world, excepting the refining and smelting of metal ores, reached a new post-war high in 1959, the Yearbook shows. In the case of the basic metal industry, the sharpness of the decline in output between 1957 and 1958 (13 per cent) and the dampening of the increase in output between 1958 and 1959 by the steel strike in the United States resulted in a 1959 level which was slightly below the 1957 level.

Although the manufacturing of metal products experienced a somewhat larger 1957-1958 decline in output than textiles, it rebounded with a 1958-1959 increase of 13 per cent, which put the 1959 level of output in this industry 8 per cent above the 1957 level.

The expansion in mining activity between 1938 and 1959 was much less than that in manufacturing activity, the Yearbook shows. Mining output in 1959 was about twice that in 1938. The rate of growth in mining activity was kept down by coal and metal mining. The volume of activity in coal mining was about the same in 1959 as in 1938 and the output of metal mining was 50 per cent greater in 1959 than in 1938. On the other hand, in the case of crude petroleum, the volume of activity in 1959 was more than three times that in 1938.

The contrast between the coal mining and crude petroleum industries is indicative of the extent to which the marked expansion between 1938 and 1959 in the consumption of energy was met by sources other than coal (e.g., fuel oils, gasoline, natural gas), the Statistical Office observes. The less rapid expansion over the same period of metal mining than of the manufacturing industries which provide the demand for ores — for example, the volume of activity in basic metals and metal products manufacturing expanded by 140 and 280 per cent, respectively, while the output of metal ores increased by 50 per cent—suggests the extent to which metal raw materials were used more efficiently and metal products were fabricated more extensively in 1959 than 1938.

Rates of expansion in coal and metal mining output between 1938 and 1959 were kept down by relatively modest increases in output during prosperous years in conjunction with relatively sharp drops in output during less favourable years, the Yearbook shows. Illustrative of this was the experience of these industries during the period 1957-1959. Between 1957 and 1958, the world volume of activity in coal and metal mining dropped by 5 and 7 per cent, respectively—rates of decline exceeded only by basic metal manufacturing in this period. Between 1958 and 1959, output in coal mining declined another 3 per cent and the volume of activity in metal mining increased by 3 per cent, recovering less than half of the ground lost between 1957 and 1958.

This occurred while the volume of activity of crude petroleum extraction increased by 7 per cent and the output of manufacturing expanded by 8 per cent. It can also be noted that 1958-1959 were the first prosperous years during the post-war period when the volume of activity in coal mining declined.

The slump in world coal and metal mining from 1957 to 1959 would have been even greater if the declines in activity in regions of the world where deposits have been worked for a long time had not been counter-balanced by the rises in activity in regions of the world where new deposits were being exploited, according to the Statistical Office. In the case of coal mining, for instance, the sharp drop in the North American level of output from 1957 to 1959 was counteracted in part by increases in the Latin American and African levels of output. In metal mining the slump in the level of output in North and Latin America from 1957 to 1959 was counterbalanced by the substantial growth in the volume of activity in Africa.

*

One hundred years have elapsed since the original Stewarts' business and Lloyd's business started independently operating in Scotland and England. The one-hundredth issue of *The Review News*, a newspaper for the employees of Stewarts and Lloyds, is appropriately devoted largely to reminiscences of some of the older employees, many of whose ancestors were employed by the company in its early days.

*

British Standard for Industrial Protective Gloves (B.S 1651 : 1960)

The seventeen types of glove specified in this revised publication offer protection against the majority of industrial hazards to which the hands are vulnerable. Shot blasting, welding, furnace work, riveting—these are some of the operations in which the wearing of gloves to B.S. 1651 will protect the operator (the standard contains an extensive list of classified hazards).

Materials for the gloves fall into four groups: leather, plastics, rubber and cotton. "Experiments", states the Foreword, "are being carried out with new material for gloves and glove linings made from man-made fabrics and mixtures of man-made fibre and cotton. Depending on the outcome of these experiments, an amendment to the standard may be issued later".

The 46-page publication specifies design particulars, size, and detailed dimensions. Also specified are requirements for materials, and for their testing.

Buyers and suppliers will find particularly useful the standard's two-page feature, "Information to be given when ordering protective gloves".

Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 2 Park Street, London, W. 1, price 10/-. (Postage will be charged extra to non-subscribers).

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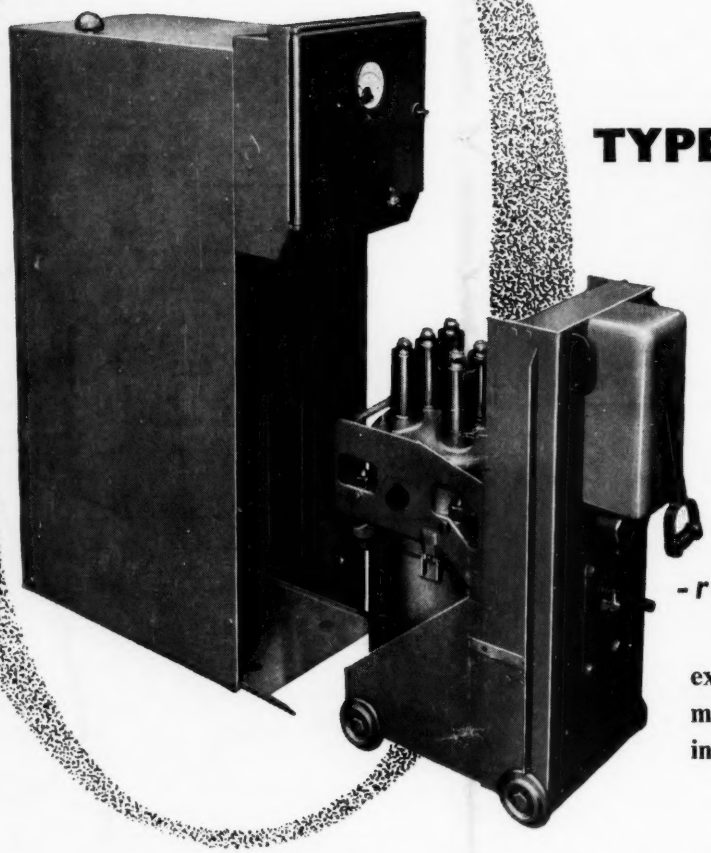

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